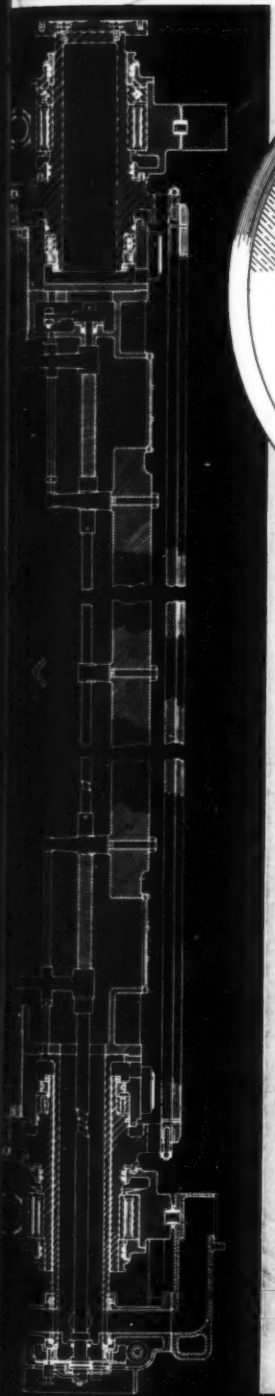
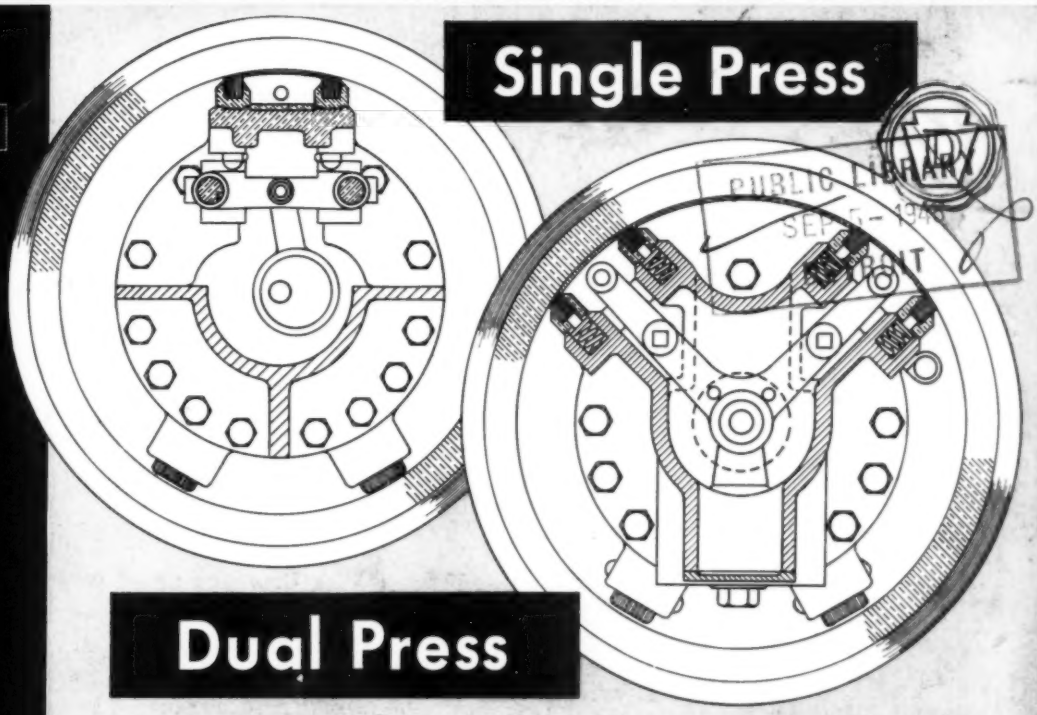
TECHNOLOGY DEPARTMENT

THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE—SEPTEMBER, 1948





Single Press

Dual Press

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FRONT

MODERN SUCTION PRESSES FOR EVERY REQUIREMENT

Downingtown Rubber Covered Suction Press Rolls are made with one suction box for a Single Press and are provided with multiple suction boxes as required for Dual Press and Triple Press applications. Suction connection may be at the front end, rear end or at both ends, if required. Front end suction may be inside or outside the machine frame. Write us for more information and a quotation on any type of suction press. All types are standard and deliveries are good.

DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.

Oldest Manufacturer of Modern Suction Rolls

DOWNINGTOWN

Designers & Builders

Paper Making Machinery

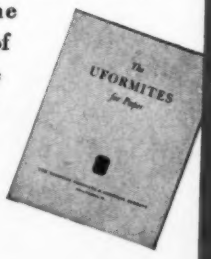
UFORMITES Boost Wet Strength As much As 300%...

... and increase dry Mullen and fold values 10% to 30%—at a cost as low as $4.00 per ton of paper pulp.

In Kraft stocks a 3-fold increase in wet-strength is typical when UFORMITE 467 is used. UFORMITE 470 gives similar increases in rag, sulfite, groundwood and stocks where low acidity is important. Wet rub, scuff resistance, "pick" resistance and service strength are all greatly improved in bag and liner stocks, map paper, blueprint paper, toweling, frozen food wraps and tag stocks. Yet no odor, taste or color is imparted, and the "feel" remains the same.

With UFORMITE urea formaldehyde resins no pretreatment is needed—no special processing or machines. Simply add UFORMITE at the beater, just as you would a rosin size, or add UFORMITE 470 at the wet end after the Jordans. Broke may be de-fibred without special equipment or long beating cycles.

For low-cost paper improvement—and satisfied customers—investigate the UFORMITES today. Your copy of our latest booklet on the UFORMITES is being held for you. Write for it now.



UFORMITE *is a trade-mark, Reg. U. S. Pat. Off.*

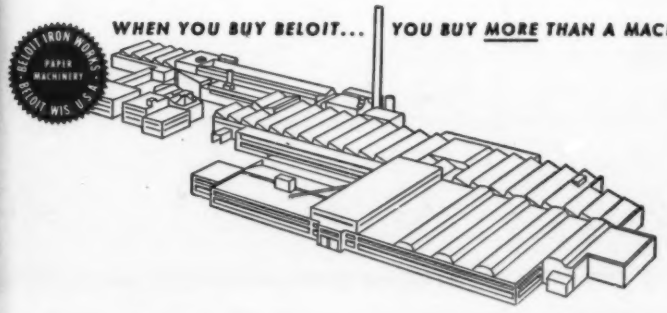
Our seal, adopted from the alchemist's symbol for a resin, means better products for you through Resinous Products.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Big, beautiful, busy

American enterprise gets an "assist" from the new Beloit 165" book machine in the West Linn, Oregon, mill of Crown Zellerbach Corp. Equipped with machine coating and the latest in air-operated controls, this machine already has attained outstanding production rates on high-grade book papers. It's a product of Beloit tradition going back to 1858. *Beloit Iron Works, Beloit, Wisconsin.*

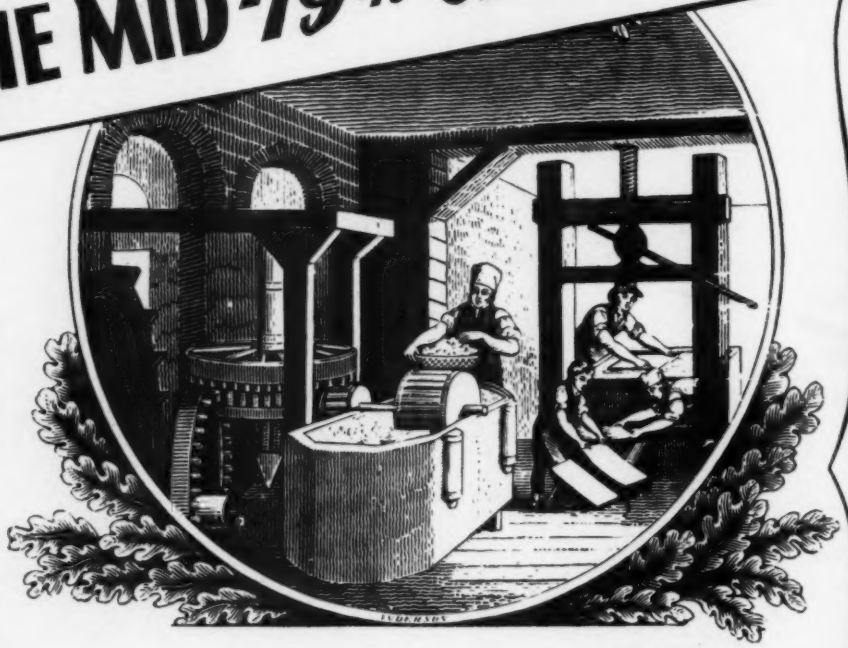


WHEN YOU BUY BELOIT... YOU BUY MORE THAN A MACHINE!

BELOIT

PAPER MACHINERY

Paper Making IN THE MID-19th CENTURY



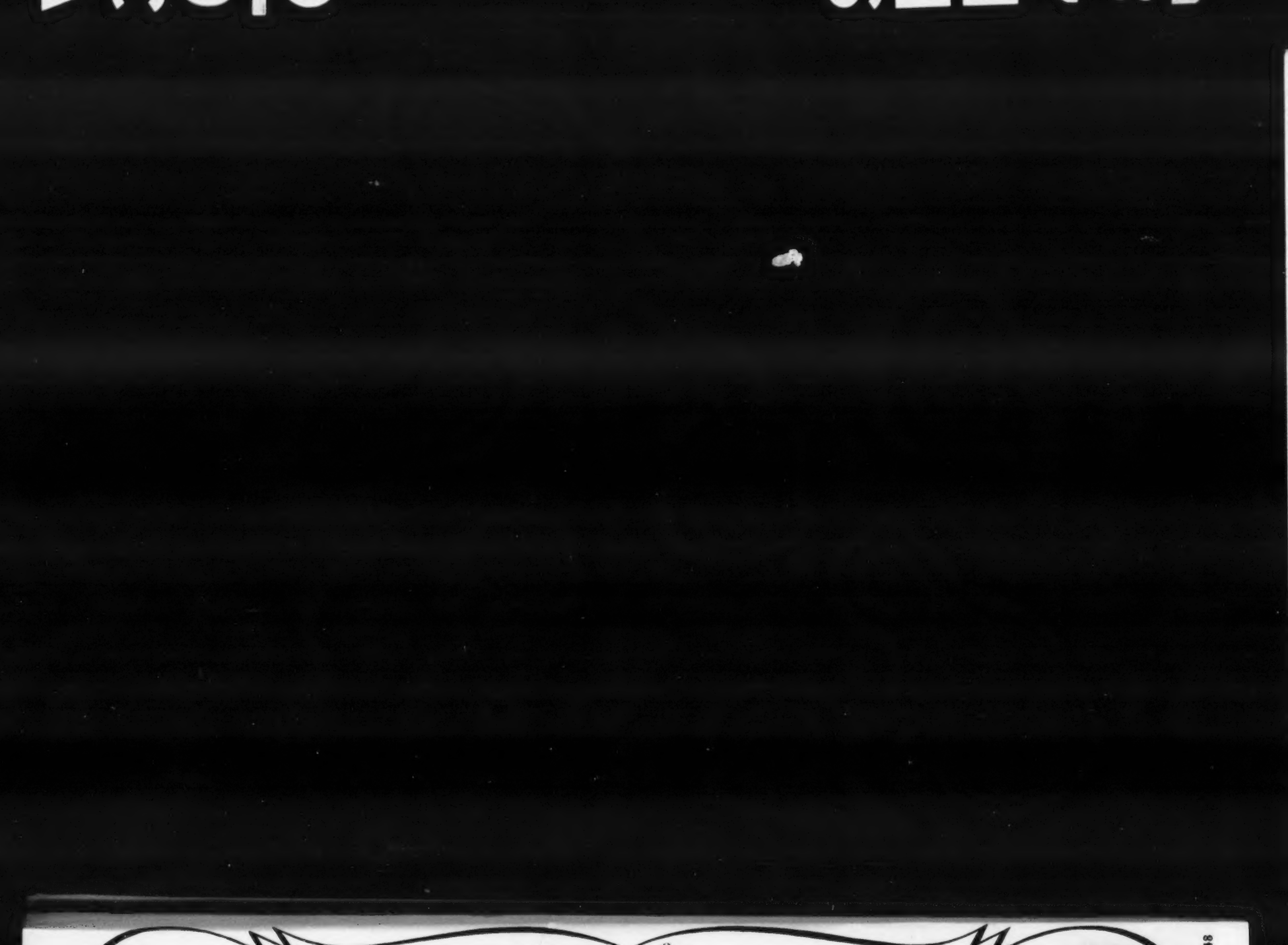
BETTMANN ARCHIVE

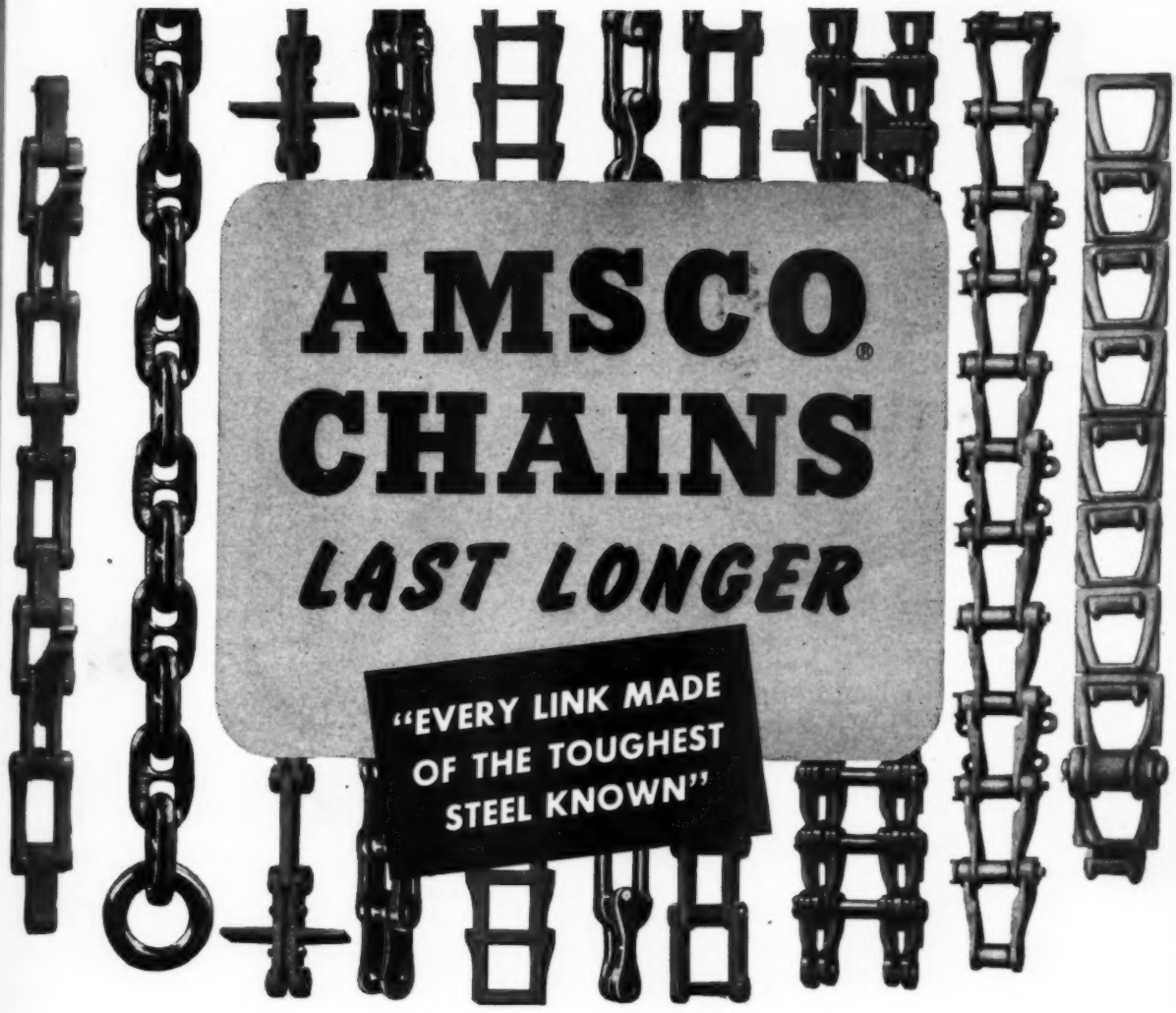
Paper making was more of an art than production. The production was limited to the individual effort of the paper maker. From this art grew today's modern production paper mill where tons of paper are produced faster than the early paper maker produced sheets. Then paper was produced sheet by sheet—but even in the early days felts were part of the equipment to the paper maker. Today felts are as important as then, having kept pace with paper making. Since 1890 Appleton felts have met all requirements of paper mill production, year after year.

This advertisement is one of a series depicting early history of paper making.

APPLETON WOOLEN MILLS

APPLETON
WISCONSIN





Replacing ordinary elevating and conveying chain is a constant drain on profits . . . a constant source of production tie-ups and delays. Stop all these worries today by installing Amsco manganese steel chain in the really tough services. It often repays its own cost many times over by its tough resistance to breakage stresses and its outstanding wear resistance.

Here's the kind of service users report: 25 months with little wear versus 8 months; 27 months with 2 years' service left where ordinary chain lasted only 3 months.

With a test-bar tensile strength of 125,000 lbs. (average test), high ductility, and a surface that work hardens to as high as 550 Brinell, Amsco manganese steel chain withstands severest stresses and grinding abrasion . . . it can be used without lubrication in dust-laden atmospheres.

Added to this is the Amsco engineering design experience that will help to meet your problem with the one best chain for trouble-free service. Write for Bulletin 742-CN . . . and let us quote on your requirements.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

...not reserved for our own use!

Just about every ton of heavy chemicals we produce is sold to outside users. And that goes for our recently expanded output, too. So, if you're unable to obtain all the caustic soda, soda ash, bicarbonate of soda, ammonia or liquid chlorine you need, try Mathieson. If you know your long range requirements, see us now about future deliveries.

Mathieson Chemical Corporation,
60 East 42nd Street, New York 17, N. Y.

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Liquid Chlorine...Chlorine Dioxide...Ammonia, Anhydrous & Aqua...HTH Products...Fused Alkali Products
Dry Ice...Carbonic Gas...Sodium Chlorite Products
Sodium Methylate

ESTABLISHED 1892. PLANTS AT NIAGARA FALLS, N. Y., SALTVILLE, VA., LAKE CHARLES, LA.

THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

VOLUME 30 - - - - SEPTEMBER, 1948 - - - - NUMBER 6

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Dodge develops *outstanding* power transmission products, as proved by the big success of Dodge-Timken Bearings on millions of industry's toughest jobs.

Dodge-Timken Bearings are supplied promptly from stock in four basic types and a wide range of sizes to meet an almost limitless variety of anti-friction problems.

Dodge also produces Ball Bearing Pillow Blocks which, with Dodge-Timken Bearings, comprise the famous "30,000 hour line." Write for complete bulletins.

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

He is your local Dodge Distributor—factory trained—qualified to suggest ways to improve your machine performance, increase production. Look for his name under "Power Transmission Equipment" in your classified phone book.

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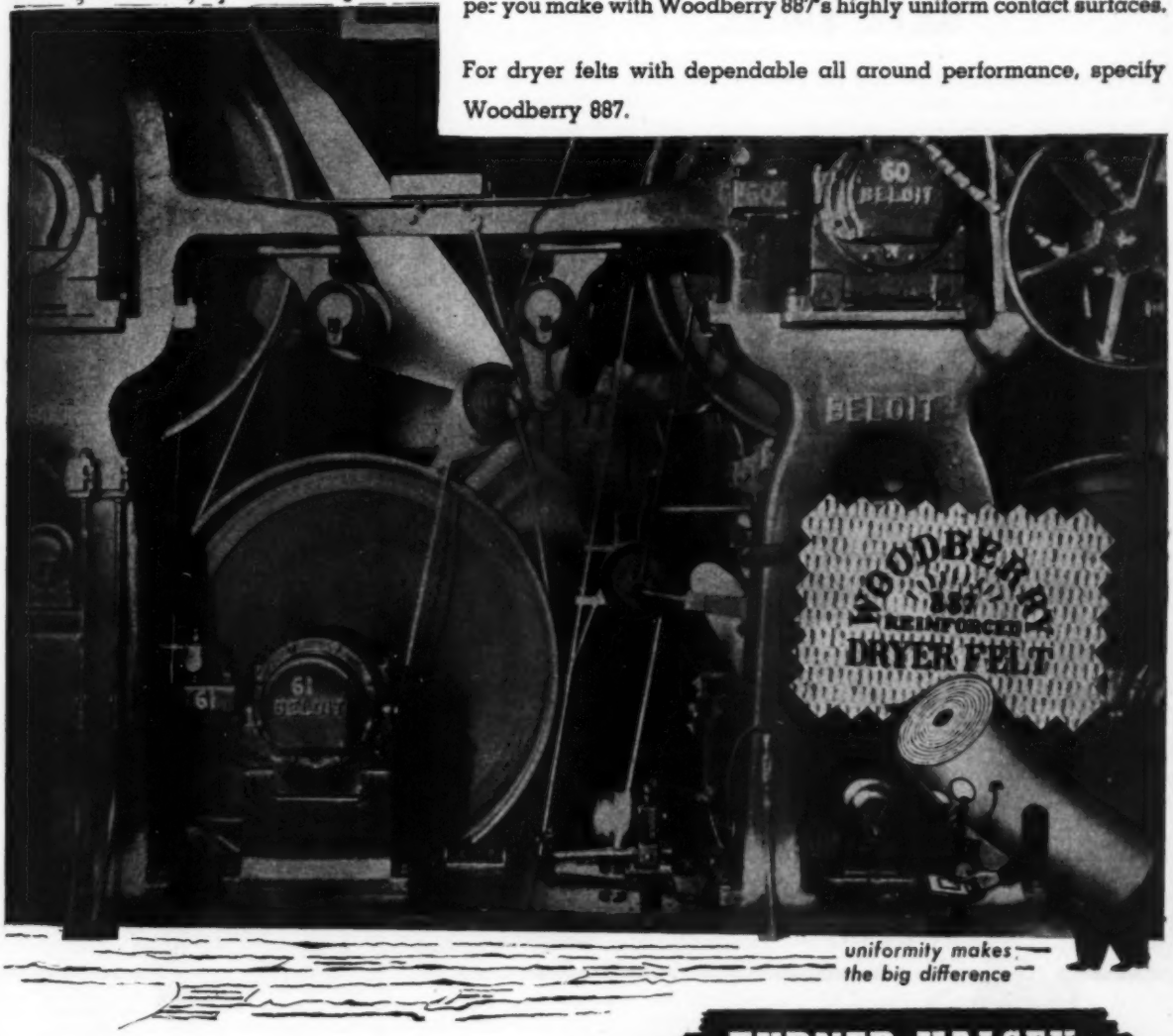
NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

Paper Production Really Rolls with Woodberry 887 Dryer Felt

These patented reinforced dryer felts really keep paper production rolling. Asbestos yarns woven at scientifically determined intervals into their face insure toughness, longer service, fewer replacements, less interruptions in production. Important too are the extra savings you'll find it the lowered steam consumption that results from Woodberry 887's high degree of porosity—the finer qualities of paper you make with Woodberry 887's highly uniform contact surfaces.

For dryer felts with dependable all around performance, specify Woodberry 887.



uniformity makes the big difference

Mt. Vernon-Woodberry Mills

TURNER HALSEY
COMPANY
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40 WORTH ST. • NEW YORK

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

A NEW HIGH ...IN BRONZE GATE VALVE DESIGN

LUNKENHEIMER

200 LB. BRONZE *UNION BONNET*

GATE VALVE

The new Lunkenheimer 200 Lb. Bronze Union Bonnet Gate Valve incorporates the first application of full cylindrical body sections in bronze gate valves. This construction, previously used only in higher pressure steel valves, provides great strength and maximum resistance against distortion of the valve body and seats due to internal pressure strains and other stresses. Tests made under the most severe conditions prove that this design will not distort and will maintain initial proportions and seat tightness.

In addition to the cylindrical body construction and other service-giving features, these valves employ Lunkenheimer's patented Alloy Stems which eliminate stem thread failure due to wear.

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"QUALITY"

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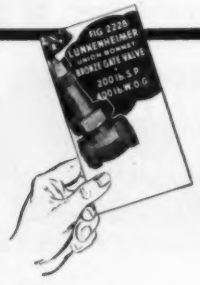
O. S. & Y.
Union Bonnet
¾ to 2 inches
Fig. 2232—Screw Ends
Fig. 2233—Flange Ends
Wedge Disc,
Rising Stem

Union Bonnet
¼ to 2 inches
Fig. 2230—Screw Ends
Fig. 2231—Flange Ends
Wedge Disc,
Non-rising Stem



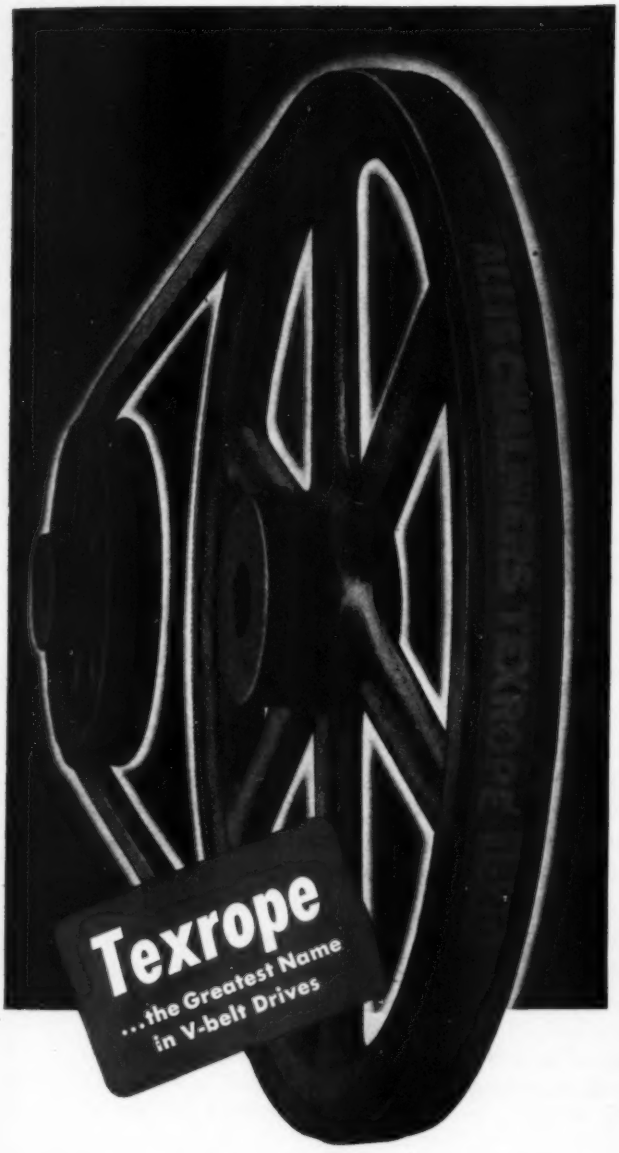
Complete information is given in Circular No. 534. Ask your Lunkenheimer Distributor for a copy or write us direct.

Fig. 2228—Screw Ends

Fig. 2229—Flange Ends

Double Disc, Rising Stem

TEXROPE F/HP Drives



- **"ENGINEERED" FOR INDUSTRY!**
- **AVAILABLE NOW!**
- **CARRY THE NAME "TEXROPE"... AND OVER 25 YEARS OF EXPERIENCE!**

IF YOU'RE IN THE MARKET for fractional horsepower V-belt drives, here are good reasons for investing in TEXROPE — the greatest name in V-belt Drives. 1) They're "engineered" — selected and applied to suit the exact characteristics of your drive. 2) They're in stock at Authorized A-C Dealers or available promptly through A-C District Offices, and 3) They're backed by the greatest collection of V-belt drive experience and facilities of any company in this business.

TEX-IRON F/HP SHEAVES

High density cast iron. Accurately bored for easy fit with tight shaft grip. Precision grooved for non-slip power and longer belt life. Carefully balanced for vibrationless operation at all speeds.

TEXROPE F/HP V-BELTS

Best known name in V-belts. Carry full rated load with plenty of overload and shock load capacity. Molded to fit sheave groove and grip tightly without excess wear or wasted power. An ideal teammate for Tex-Iron sheaves. Highly efficient on present sheaves, too.

The complete range of Tex-Iron sheaves from 2 to 15 inches PD and Texrope V-belts to match are now available from your dealer's stock. Call him today. Texrope, Tex-Iron, Super 7, Texsteel, Magic Grip and Vari-Pitch are Allis-Chalmers Trademarks. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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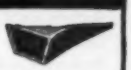
A Complete Range of Products

Super-7 V-belts	5 types . . . sizes to suit every power transmission job	
Texsteel, Texdrive, Magic-Grip	Sheaves in a full range of sizes and grooves	
Vari-Pitch Sheaves	Exact variations in speed — Stationary or Motion control	
Speed Changers	Speed variations up to 375% at the turn of a crank	

SEND TODAY for Allis-Chalmers 44 page book No. 2086249A describing Texrope F/HP V-belt drives — the Fractional Horsepower Drive that's "Engineered" for Industry. Result of years of experience in engineering FHP V-belt drives. Shows you simple, accurate way to select FHP sheaves and belts. Every FHP drive user should have a copy.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

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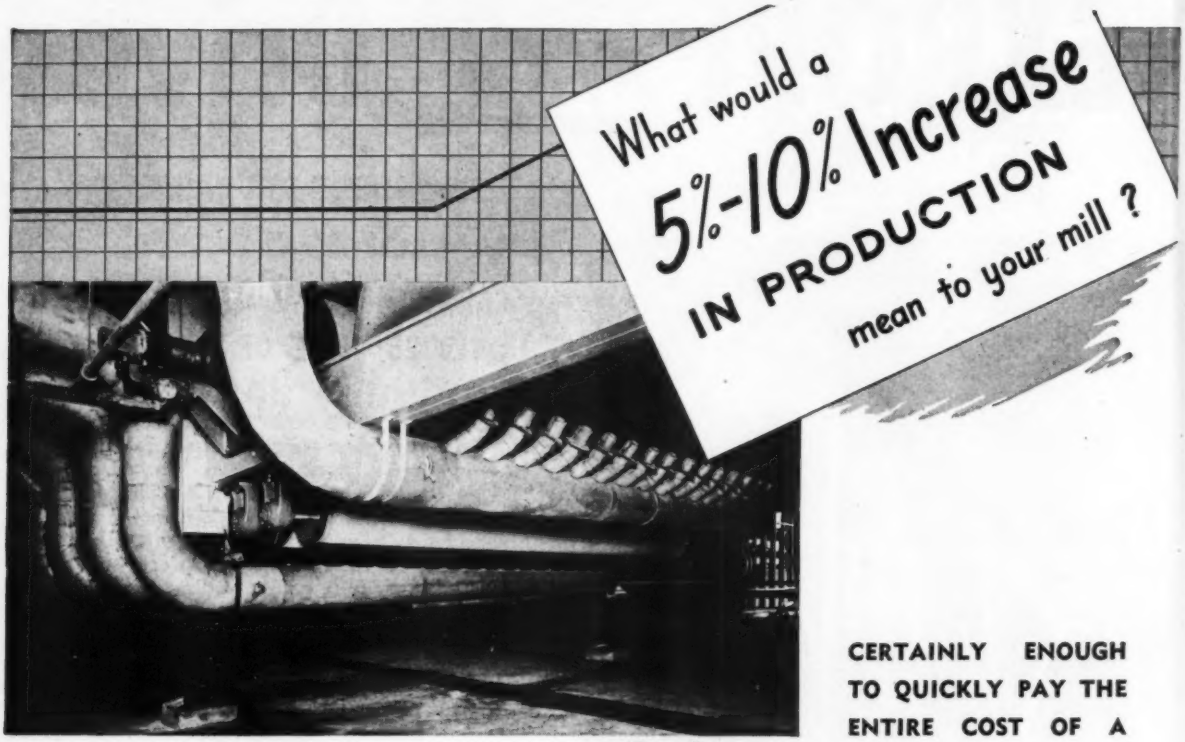
Originators of the Multiple V-belt Drive for Industry



What would a 5%-10% Increase IN PRODUCTION mean to your mill ?

CERTAINLY ENOUGH TO QUICKLY PAY THE ENTIRE COST OF A

ROSS Felt Drying SYSTEM

Ross Felt Drying System on St. Mary's Kraft Machine—St. Mary's, Ga.

Among Other Recent Installations Are:

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Vapor and moisture soaked felts cannot fail to seriously retard drying. Installations of Ross Felt Drying Systems have consistently increased production by from 5% to 10%. Not only are the felts kept in condition to take up additional moisture with each pass over the paper but the warm blanket of air around the sides of the nest of dryers provides a barrier against cool room air—another cause of retarded drying. Of equal importance from a standpoint of savings, is the greatly prolonged life of the felt—sometimes doubled—from operation of this system.

You don't spend for a Ross Felt Drying System. You invest in one. Every modern mill should have one.

ROSS RS SYSTEMS

J. O. ROSS ENGINEERING CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

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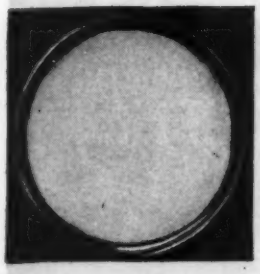
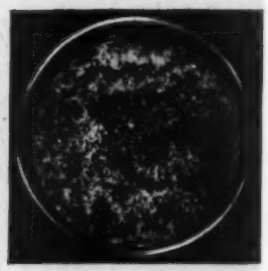


plus...

or

minus



DOWICIDES make the difference

"Plus" your profits! Reduce paper losses due to mold—use the Dowicides.

Corrugated cartons and other paper products often deteriorate when stored under conditions of high humidity in damp warehouses. This condition is usually accompanied by unsightly discoloration of the package and offensive odor. Many processors have successfully used a Dowicide treatment to make containers for industrial products mold resistant.

This is only one of the many uses of the Dowicides in the pulp and paper industry. For further information on the application of these versatile fungicides and bactericides, contact your nearest Dow office.

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St. Louis • Houston • San Francisco • Los Angeles • Seattle
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CHEMICAL COMMENTS

MORE AND MORE JOBS FOR DOWFLAKE

Dowflake (Dow's convenient flake-form calcium chloride) has long been well known and valued in Portland cement concrete construction and for making gravel or similar type roads firm and dustless. But many and diversified are its other applications. It dustproofs and freezeproofs coal. It serves as a refrigerant in the frozen food industry as well as in leading warehouses and ice plants, where it circulates freely at subzero temperatures and reduces operating and equipment costs. It acts as an antifreeze in fire barrels. And now it is more and more in demand as a dehumidifier of damp basements, game rooms and storage areas. Dowflake is a real career chemical!

50 YEARS WITH BROMINE

The first products manufactured by Dow over 50 years go were the bromides —and today over 100 bromine products, both organic and inorganic, are being produced for use by many and varied industries. The story of these interesting chemicals and their properties makes up a new booklet entitled, "Bromine and Bromine Products." A copy may be obtained by writing the nearest Dow office.

METHOCEL IS OUR "GOOD MIXER"

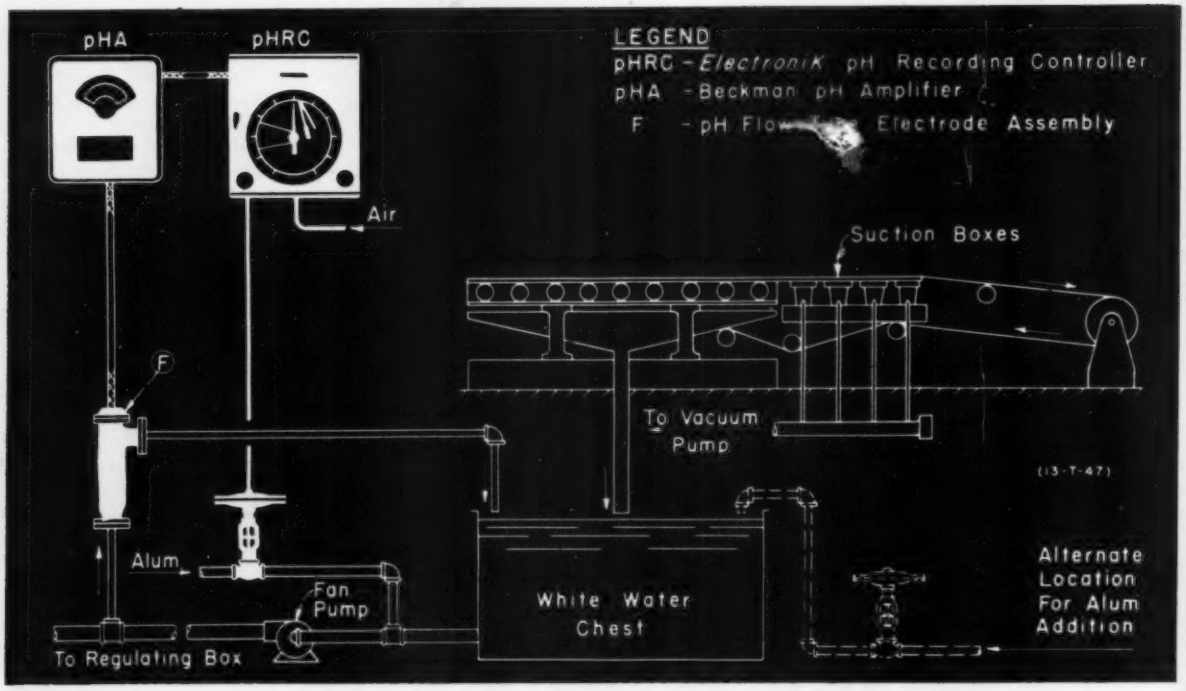
Methocel (Dow Methylcellulose) is soluble in water, and yields neutral solutions in a wide range of viscosities, varied to suit many diversified applications. Many industries, including paper, paint, leather, textiles and cosmetics, make use of Methocel's widely applicable properties which make it ideal as a dispersing, thickening, stabilizing, emulsifying, binding and coating agent.

Additional information about any of these products is available on request.

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

pH Control of Head Box Stock Essential to Even Sizing



ElectroniK Recording pH Controller

Maintenance of a constant pH of the head box stock is one requirement of quality paper making. If pH is too high, an insufficiently sized sheet results; if too low, sizing is uneven and alum is wasted.

Once adjusted, head box stock can be held at the correct pH value by automatic control of the white water make-up. The diagram illustrates a control system successfully employed in a number of mills. In this system an electrode electrically measures the acidity of the white water being fed to the head box. The current developed passes through the amplifier which is connected to the *ElectroniK* Recording Controller. The controller maintains the pH of the solution constant by making changes in the rate of alum addition.

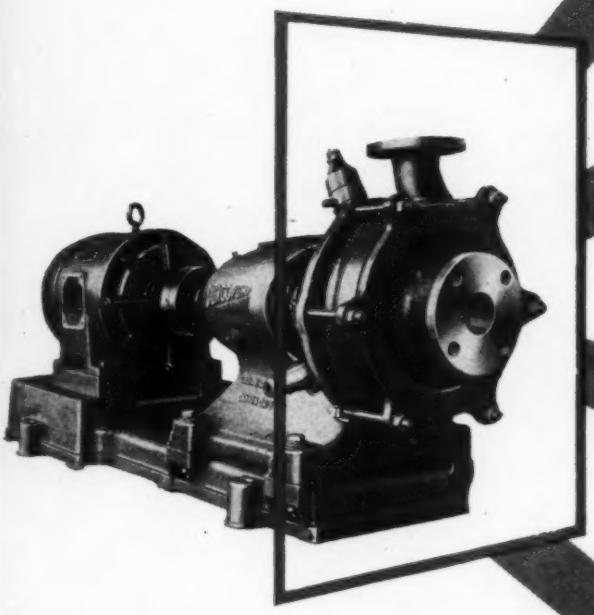
At many points in paper mill processes, pH control is aiding in minimizing waste, improving product quality and uniformity, reducing corrosion and increasing production rates. Because of their extensive experience in paper mill instrumentation, Brown engineers are qualified to analyze every control problem and to recommend the instruments and controls best suited to the individual mill. Call on them to help you—and write for the 80 page Bulletin 2801—"Instrumentation for the Paper Industry".

THE BROWN INSTRUMENT CO., 4489 WAYNE AVE., PHILADELPHIA 44, PA.
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

Offices in principal cities of the United States, Canada and throughout the world.

BROWN *Advanced Instrumentation* **FOR BETTER PROCESSING**
MINNEAPOLIS **Honeywell**

You can interchange this pump's CORROSION RESISTANCE to fit the corrosive



The wet end parts of this Model 40 Durcopump —casing, casing cover, impeller and shaft sleeve—can be easily changed from one corrosion-resisting alloy to another.

Without changing the operating characteristics or disturbing the motor, bearings or alignment, you can give your Durcopump the ability to handle an entirely new group of corrosives.

Model 40 Durcopumps are available in capacities up to 2000 GPM and for heads as high as 230 feet.

28-GM

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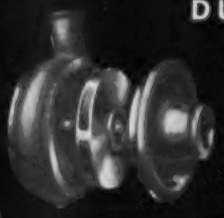
DAYTON 1, OHIO

Branch Offices In Principal Cities

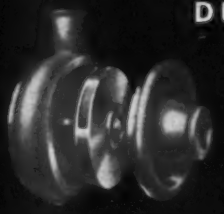
DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

DURIRON



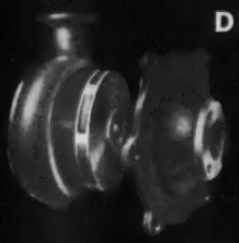
a high-silicon iron, containing approximately 14.5% silicon. Handles almost any commercial corrosive. Practically unaffected by sulfuric, nitric and acetic acid at any strength or temperature. Ask for bulletins 11 and 810.

DURICHLOR



a high-silicon iron similar to Duriron but with much greater resistance to hydrochloric acid and its compounds, especially at higher temperatures and concentrations. Ask for bulletins 50 and 810.

DURIMET



a high nickel—high chromium—molybdenum—copper—silicon—low carbon stainless steel. Some of the corrosives it successfully handles include sulfuric and sulfurous acid, oleum, caustic and bleach solutions. Ask for bulletins 110-2 and 811.

CHLORIMET

#2—nickel base, high molybdenum alloy; #3—nickel base, high molybdenum, high chromium alloy. Both of these are high strength, machinable alloys. Chlorimet #2 handles hydrochloric acid in all concentrations and temperatures. It is excellent for hot sulfuric acid under reducing conditions and for wet hydrogen chloride gas. Chlorimet #3 handles most acids under oxidizing conditions, various salt solutions, also hot sulfuric in concentrations of less than 35%. Ask for bulletins 111 and 811.

OTHER ALLOYS

Durco D-10, Monel, Inconel, Pure Nickel, Ni-Resist and Nickel Cast Iron.

Camachines

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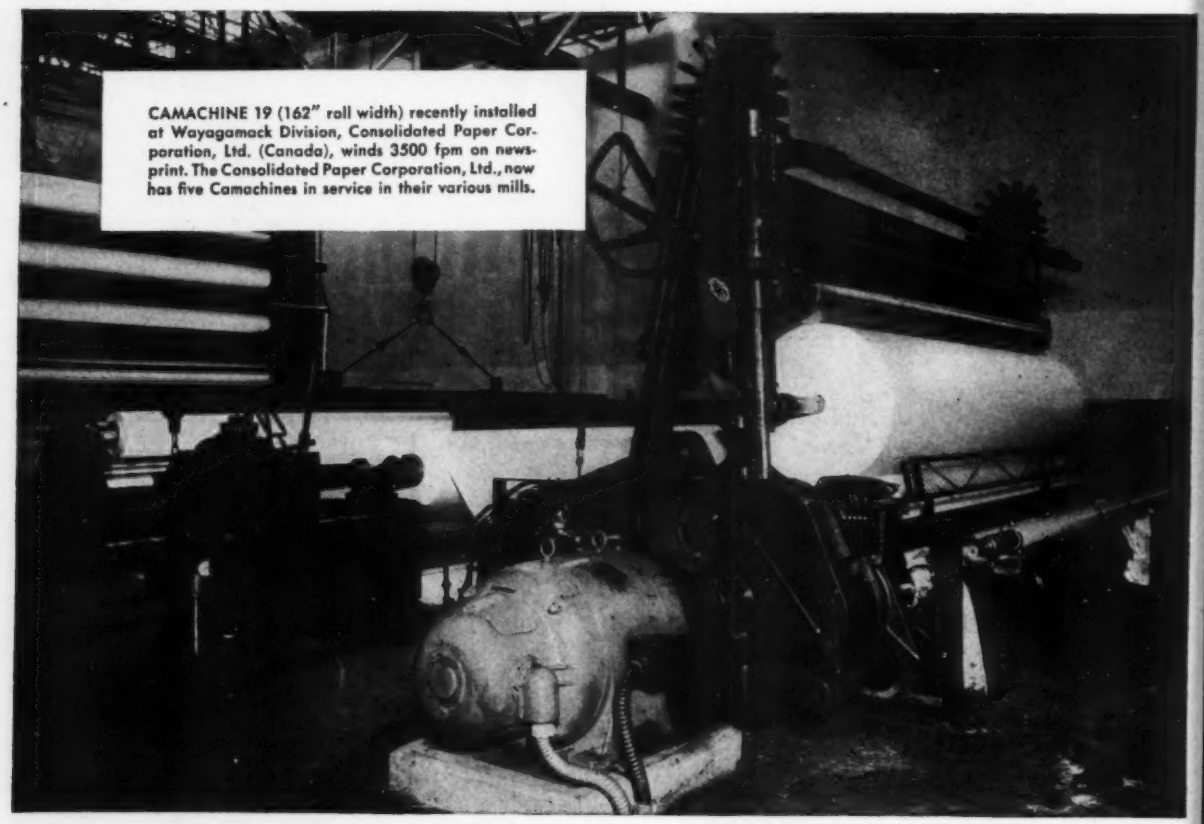


CAMACHINE 19 (162" roll width) recently installed at Wayagamack Division, Consolidated Paper Corporation, Ltd. (Canada), winds 3500 fpm on newsprint. The Consolidated Paper Corporation, Ltd., now has five Camachines in service in their various mills.

CAMACHINES, the world over, are keeping well ahead of the pace set by the fastest paper mills . . . producing top-quality shipping rolls of news, book, kraft and paper-board at speeds up to 5000 fpm on newsprint.

Clean-cut, wrinkle-free Camachine rolls, wound to uniform density from core to circumference, give smooth performance on the fastest of web printing presses and processing machines. Exclusive Camachine pneumatic web tension assures constant automatic control of the roll density even at the highest winding speeds.

Other exclusive new Camachine engineering features which are optional on the big mill-type Camachines are: the pneumatic brake on drive and idler roll; push-button controlled motor-driven riding-roll lift and roll ejector; and pneumatically controlled pressure on the cutter wheels and cutter spacer bar.

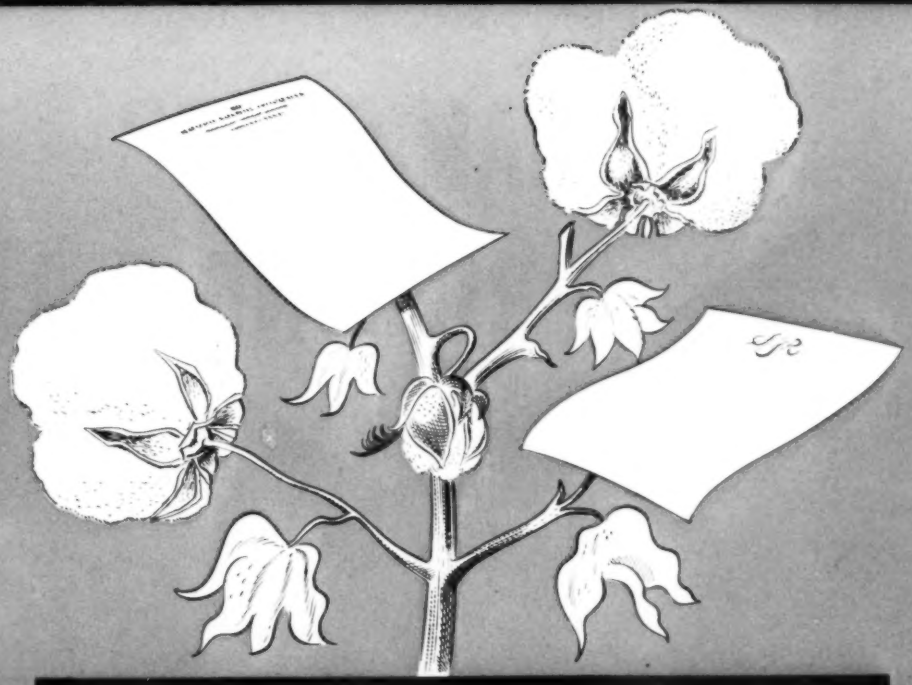
Write for illustrated literature on modern Camachine slitting and roll-winding equipment for all paper mill and converting plant requirements.

Cameron Machine Company, 61 Poplar St., Brooklyn 2, N.Y.

Camachines
FOR FAST, TOP QUALITY ROLL PRODUCTION
...the world over

VISION

in high quality paper the trend is to



cotton linters

Good usable cotton rags for papermaking are getting scarcer, more costly every day. But papermakers do not have to accept less satisfactory substitutes. Hercules Bleached Cotton Linters are rapidly gaining acceptance as high quality extenders for rags. Their performance in rag-content writing papers, for example, is well known. Their clean virgin fibers contribute good color, permanence, feel, bulk, opacity, and sheet structure to the paper. Write for helpful technical information on adapting Hercules Bleached Cotton Linters to your paper processing.

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Kelgin provides an unexcelled film barrier; makes possible a surface that is uniformly smooth and dense for even penetration of printing inks, oils and waxes.

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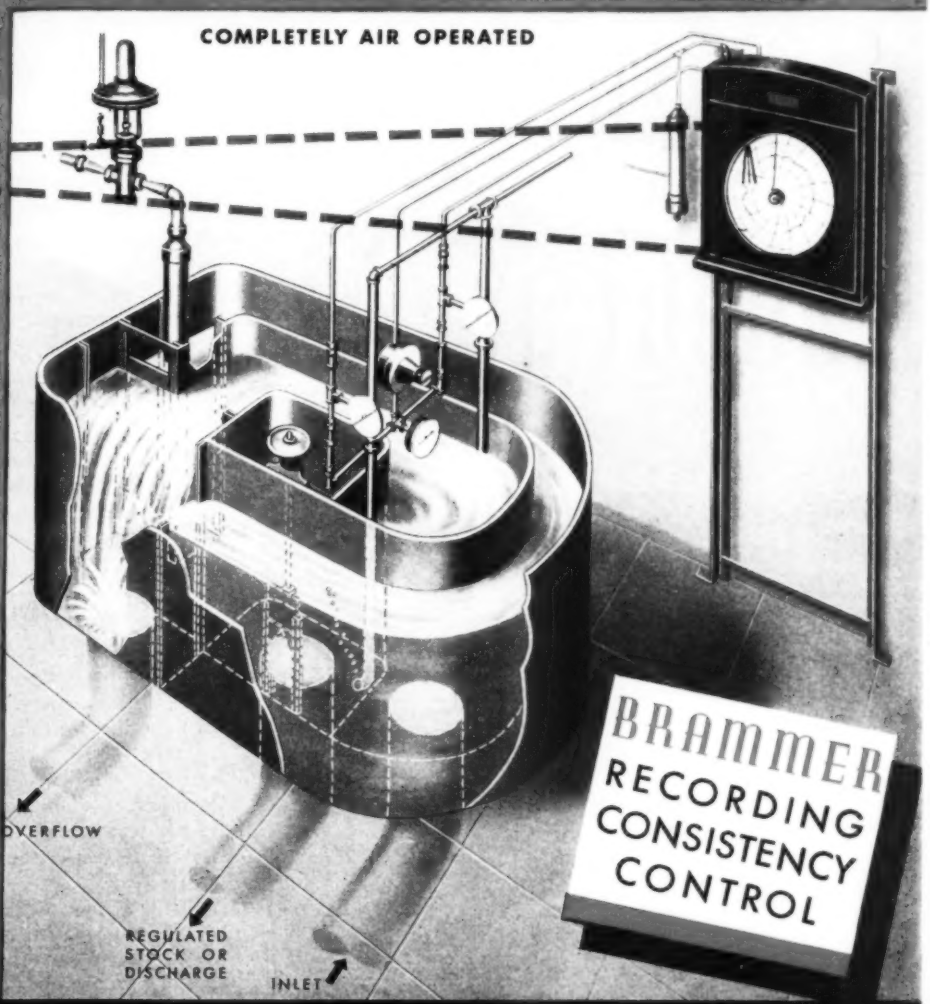
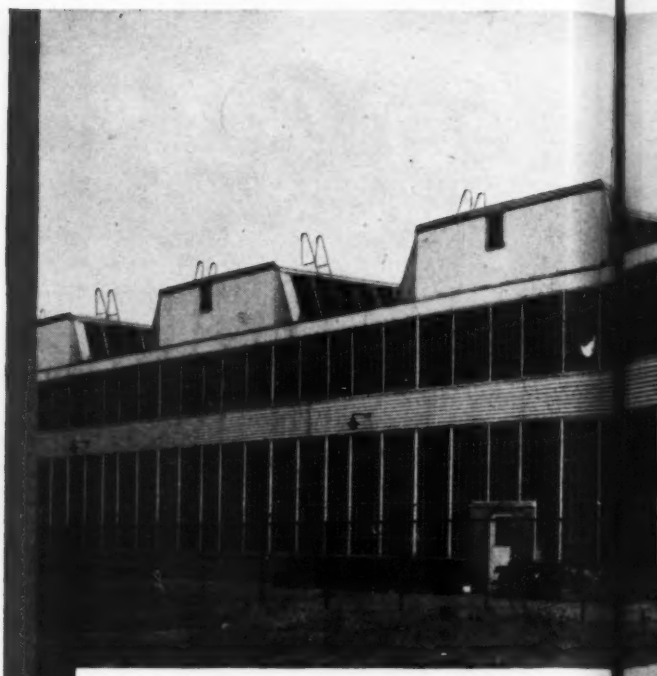


PAPER and INDUSTRIAL APPLIANCES, INC.
122 EAST 42nd STREET NEW YORK, N. Y.

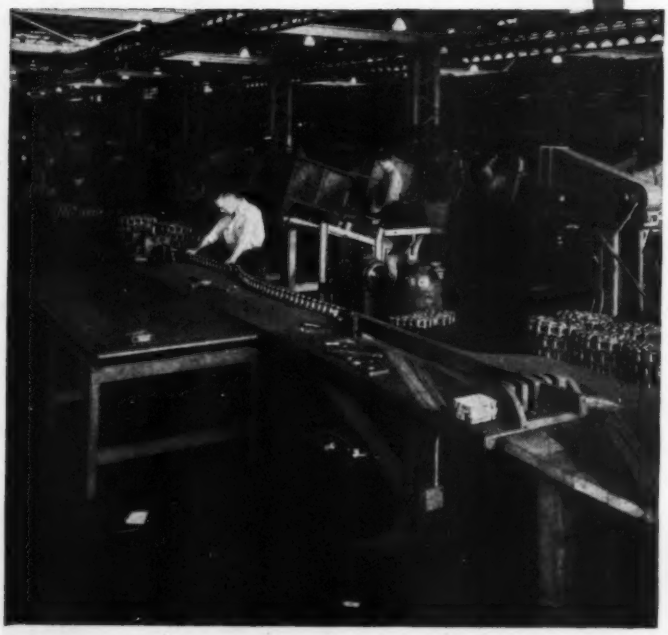
we're doing something about it!



. . . in fact, we're doing a lot about the long delivery situation on vitally needed pulp mill chains. For example, here are just a few of the things we *have done . . . and are doing* . . . to make more and more chain available to keep up with the vastly increased demand.

A NEW REX CHAIN PLANT . . .

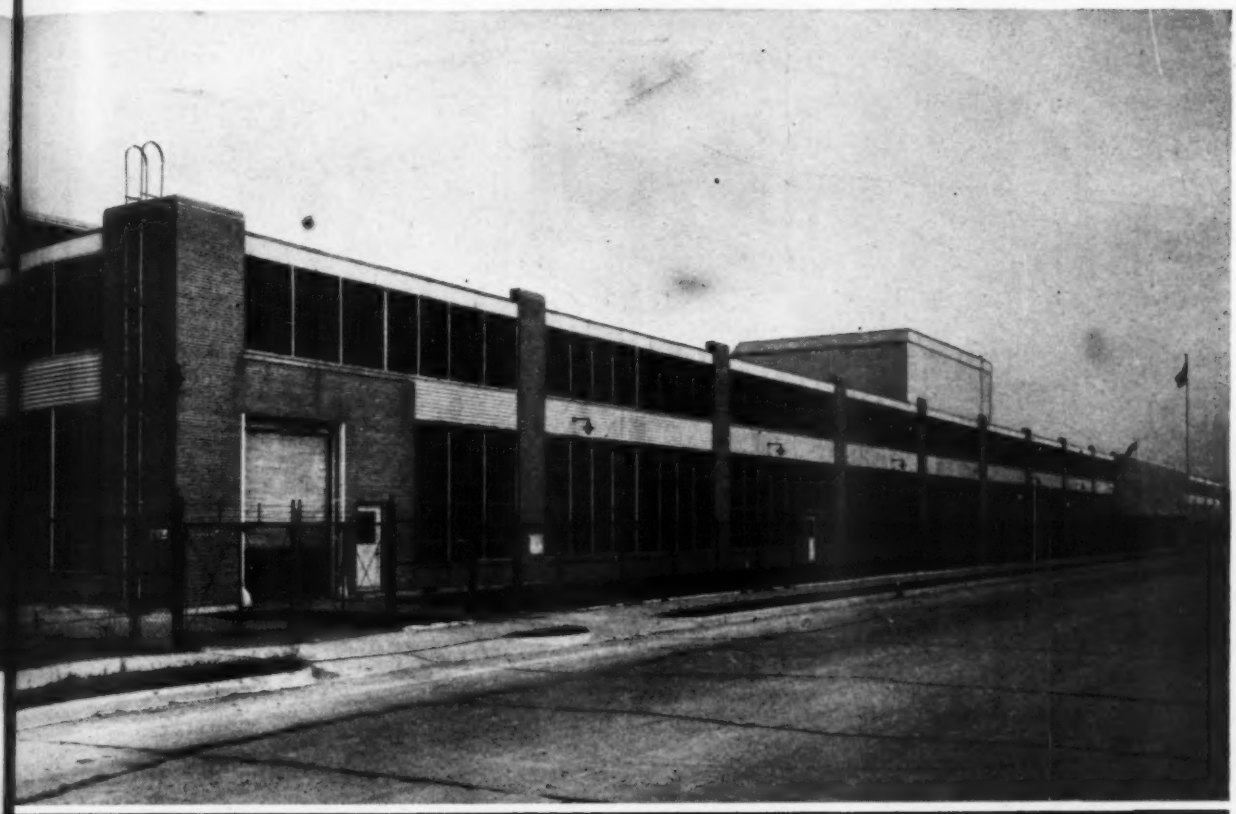
the most modern in the industry. Through the addition of our new chain plant, equipped with the most up-to-date high speed equipment, we have been able to greatly increase our productive capacity.



BETTER PRODUCTION METHODS

Our new plant, plus modern assembly line production methods, is another step toward our goal of more chain for you. The illustration at the left shows our H-78 Chain assembly line . . . a new development which has not only doubled our production but has improved the quality of the chain. Uniformity of product is insured, and the method allows for closer inspection and testing.

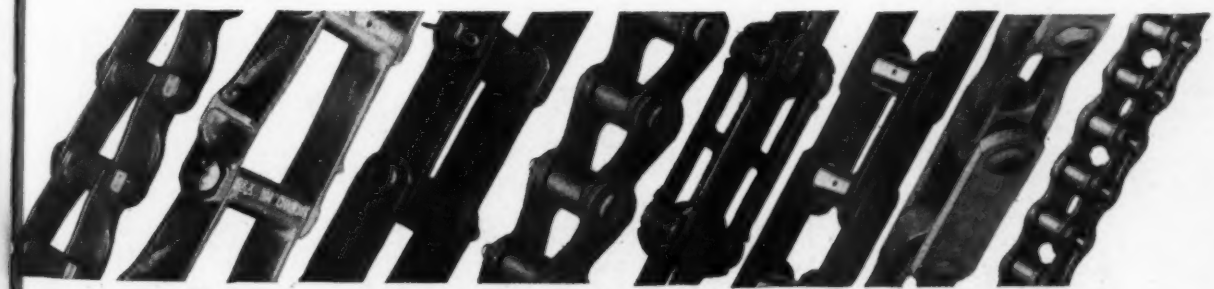
CHAIN BELT
REX
COMPANY



STANDARDIZATION . . .

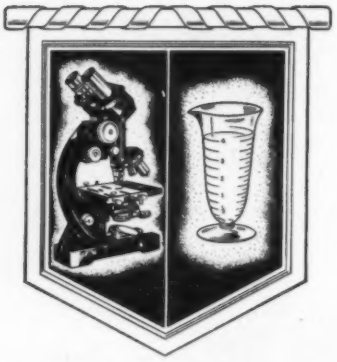
To assure better service to you, the Rex Chain Line has been standardized. Through the elimination of many duplicate and overlapping product items, we have been able to increase production to assure better availability *without affecting the completeness of the Rex Line for all applications.* By specifying standard Rex Chains, you can simplify your inventory and replacement problems as well as speed deliveries.

These are but a few of the many steps we have taken to give you better service. *We are doing something about it!* For all the facts on the Rex Line of Pulp Mill Chains, call your Rex Field Office or write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.



Rex H Type Drive Chains | Rex H Type Conveyor Chains | Rex Durobar and Combination Chains | Rex Chabelco Steel Chains | Rex Drop Forge Chains | Rex Barking Drum Chains | Rex Log Haul and Conveyor Chains | Baldwin-Rex Roller Chains

DRIVE AND CONVEYOR CHAINS



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ANOTHER BIG MILL SPEEDS PRODUCTION

At the great Port Wentworth, Georgia plant of the Southern Paperboard Corporation, six 8-inch motor-operated Yarway Digester Blow Valves play a big part in speeding production. This is just another instance of the outstanding success leading paper mills are experiencing with Yarway Digester Valves.

The Yarway *seatless* principle assures a *tight* valve—effectively sealing off the digester, preventing loss of black liquor, increasing number of cooks per day. The remote push button motor control speeds operation.

Metallurgical advancements also enable Yarway Digester Valves to withstand the unusual pressure, shock and chemical action encountered in this service.

For more information, write . . .

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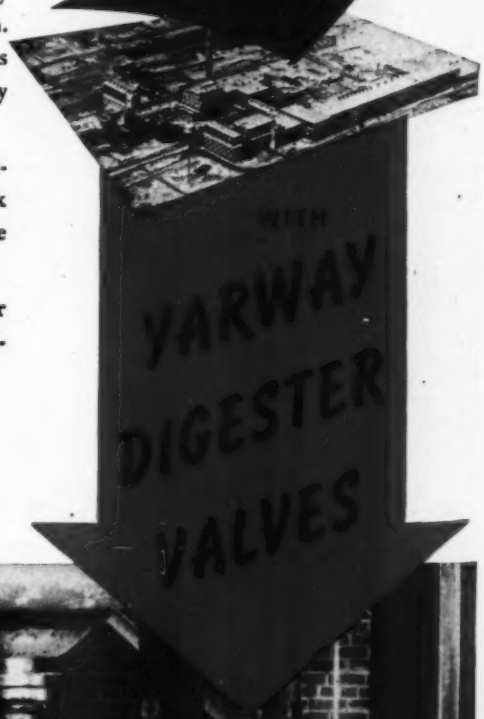
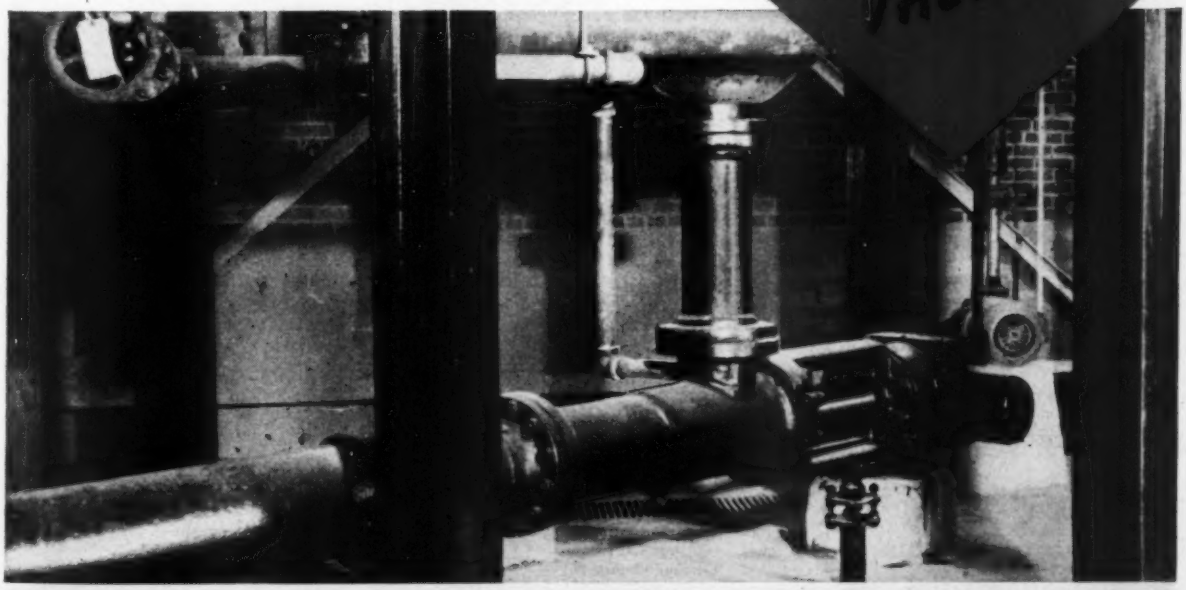
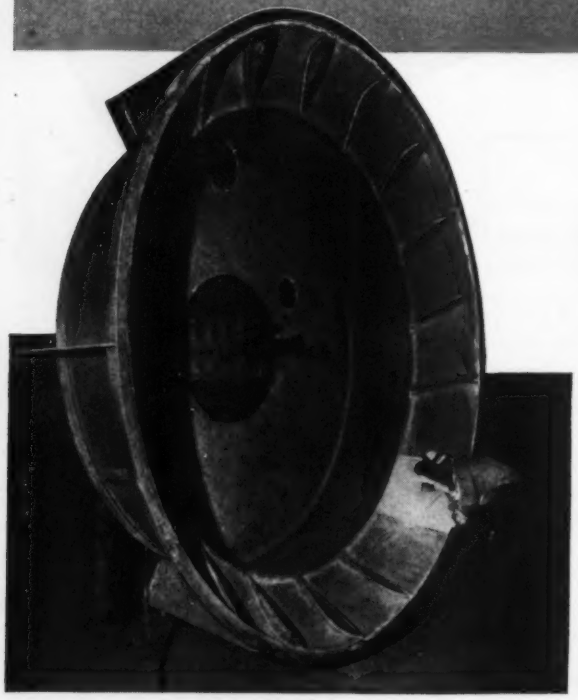


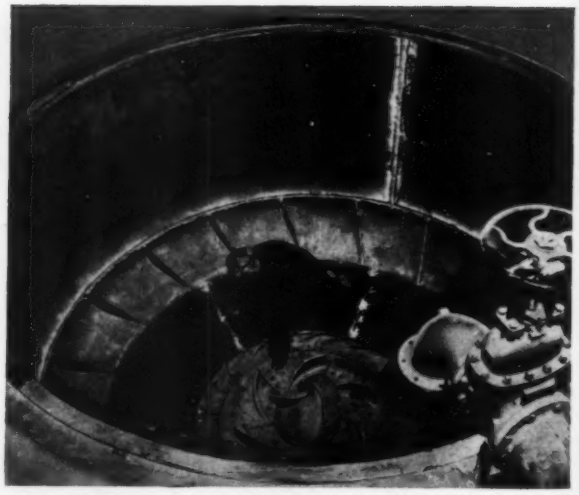


YARWAY BLOW-OFF VALVES

20% INCREASE IN PRODUCTION! NO MAINTENANCE SHUTDOWNS!



It's made of Nickel-Clad Steel



(*Left*) Fabricating a hydrapulper for Dilts Machine Works, Fulton, N. Y., Div. of Black-Clawson, Inc., Hamilton, Ohio, in the plant of Smith & Caffrey Co., Syracuse, N. Y. (*Right*) Installed hydrapulper, showing Lukens Nickel-Clad Steel on tub sides and bottom plates surrounding the rotor; in use at National Paper Corporation, Ransom, Pa.

Self-cleaning and corrosion-resistant properties of Lukens Nickel-Clad Steel for hydrapulpers make an important contribution to their excellent service records. The above hydrapulper has been in service at the National Paper Corporation, Ransom, Pennsylvania, for more than 16 months without a shutdown for maintenance.

In operation, the work-polished walls of Lukens Nickel-Clad Steel, with the cladding on the inside, require no sluicing down, in contrast to the former type tubs which required at least one sluicing per four fills. This factor was the major contribution in increasing the machine's output approximately 20 per cent. In addition, there is no metallic pick-up to impair the quality of tissue made from furnish produced here.

Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—provide *solid* corrosion-resistant metal protection at the lower cost of *clad* steels. 10% or 20% of total plate thickness suits most applications. Lukens offers the most complete range of clad steels available from any source; $\frac{1}{16}$" to over 3" thick, or as wide as 178".

Bulletins 255 and 338 give information which will help you adapt Lukens Clad Steels to your equipment. For copies, write Lukens Steel Company, 408 Lukens Bldg., Coatesville, Pennsylvania.

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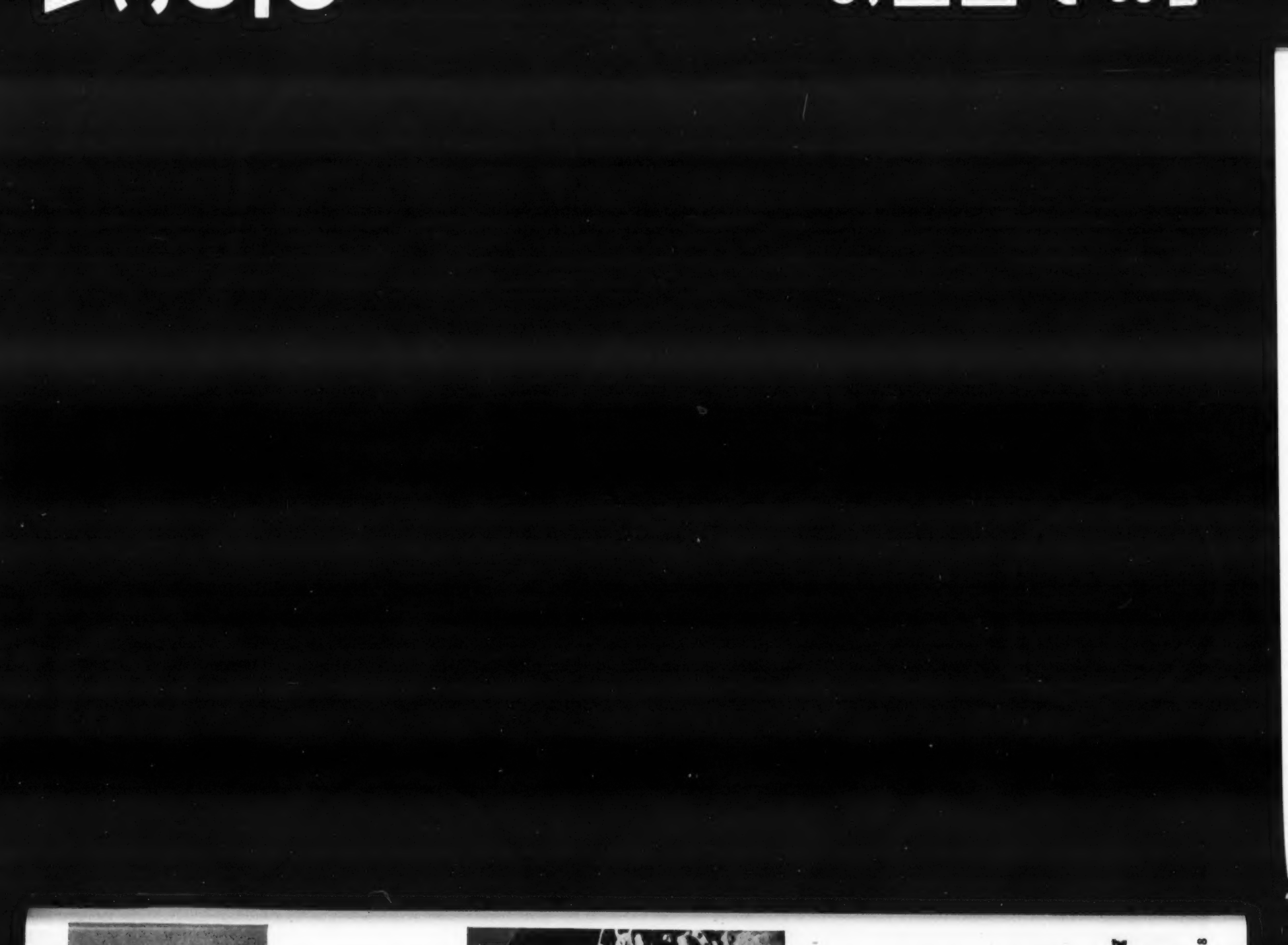
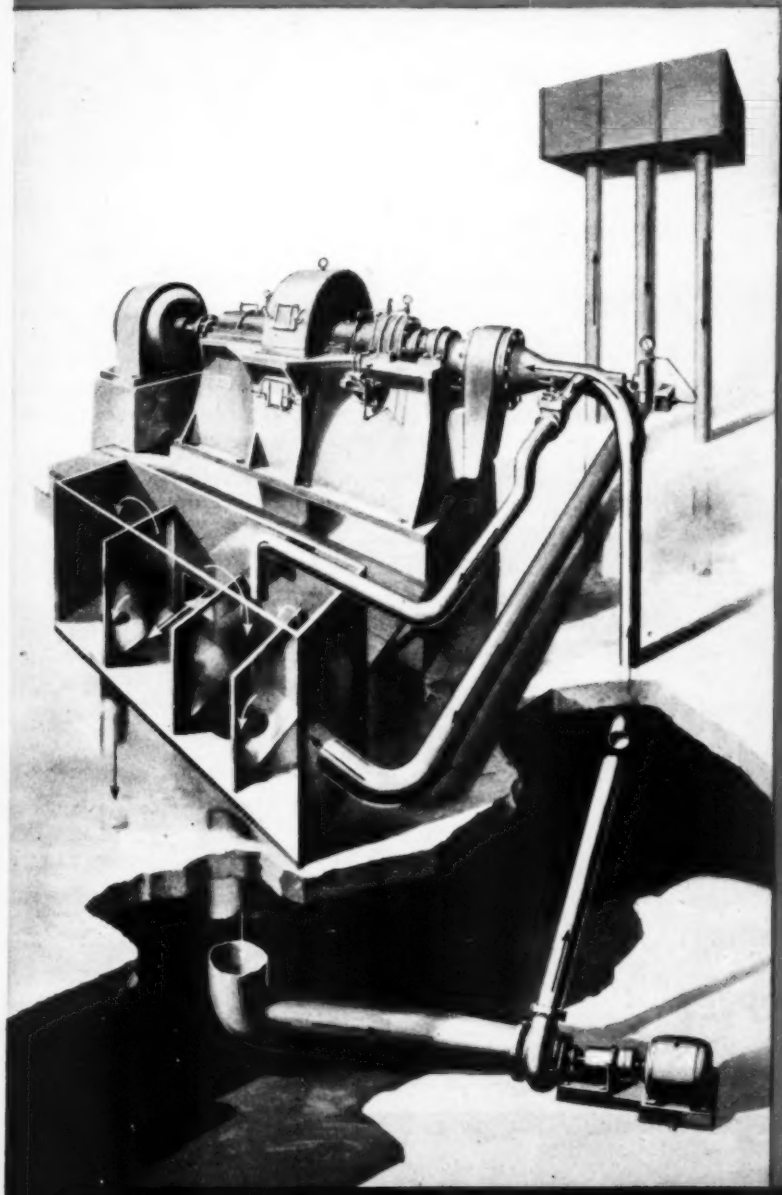
Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY



Problem

You've increased production at the expense of quality. How to regain quality without sacrificing speed?



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Continuous BEATING
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Solution

Replace old fashioned equipment, though it may be fairly young in age, with modern Sutherlands. They give the maximum amount of pulp per square foot of floor space. This can all be done with substantial savings in power and maintenance costs.

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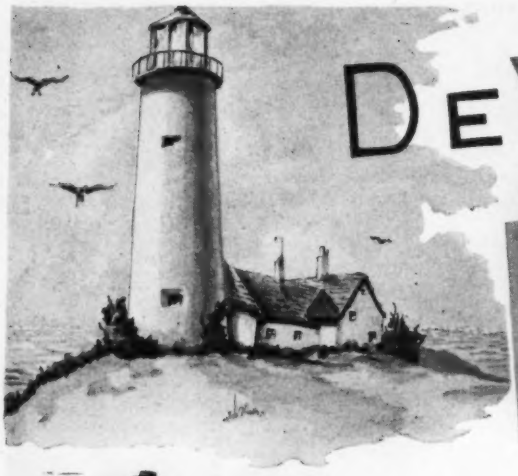
SUTHERLAND



DEPENDABLE VALVES

to safeguard *flow control services* in all industries

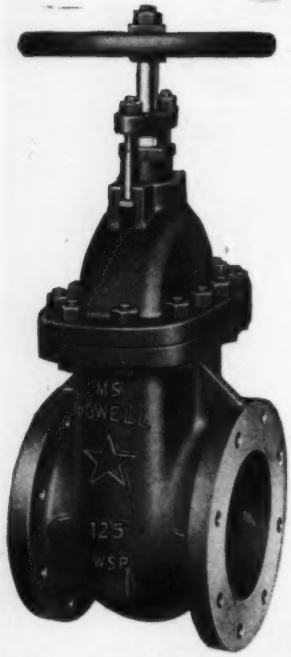
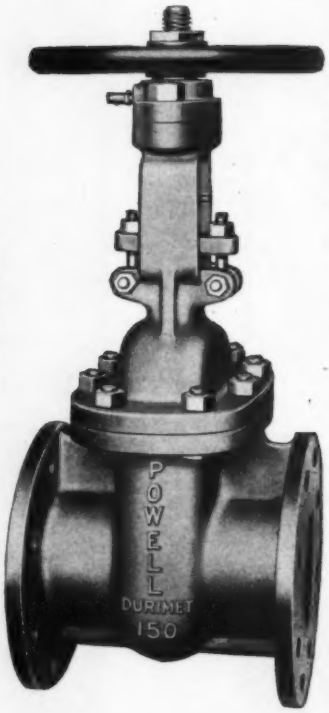


Fig. 1787 — Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", incl. Has flanged ends, bolted flanged yoke, inside screw non-rising stem and tapered solid wedge. Also available with double wedge in sizes 2" to 12", incl—Fig. 1431.

Fig. 2453-G—Standard 150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge.



Just as mariners depend on lighthouses to safeguard their ships, so the men of industry depend on their flow control equipment to safeguard their manufacturing plants from "going on the rocks" of costly shut-downs.

With a background of more than a century of making valves—and valves only—Powell Engineers know how to make a valve dependable.

And because the Powell Line is so *complete*, there are Powell Valves—in Bronze, Iron, Steel, and the widest range of Corrosion-resistant materials ever used in making valves—specifically designed and made to give long, dependable performance in each and every flow control service known today.

It pays to consult Powell Engineers on all your requirements for flow control equipment.

Fig. 375—200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable wear-resisting "Powellium" nickel-bronze disc.

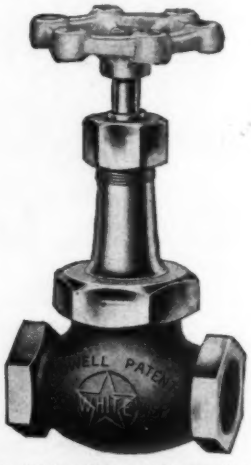


Fig. 1708—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable, wear-resisting "Powellium" nickel-bronze disc.

The Wm. Powell Company

Cincinnati 22, Ohio

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In almost every step of paper manufacture from the preparation of pulp to the sizing, filling, and coating of the finished sheet, chemicals are indispensable and must be chosen with exacting care. Paper makers who want to be sure of the quality and uniformity of the alum, salt cake, and other process chemicals they use, specify "General Chemical."

ALUMINUM SULFATE

Standard: Lump; Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh.

Iron Free: Lump, approx. 2½"; Ground, thru 8 mesh.
Liquid

SODIUM SULFATE

(Salt Cake) . . . Paper Makers' Grade, thru 8 mesh.

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- Aqua Ammonia
- Sodium Fluoride
- Tetrasodium Pyrophosphate (Anhydrous)
- Sodium Bisulfite (Anhydrous)
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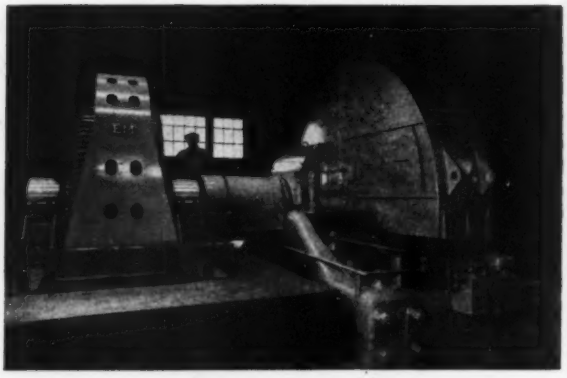
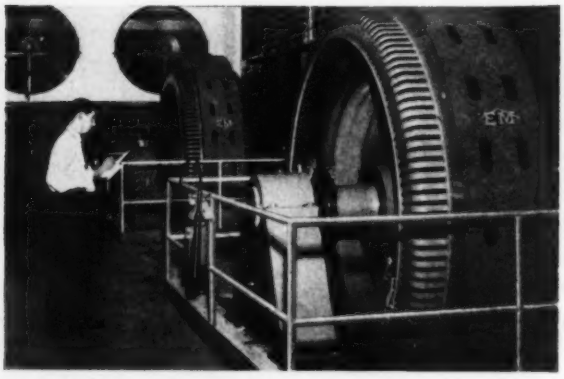
BASIC CHEMICALS
GC
FOR AMERICAN INDUSTRY

10 WAYS TO CUT COSTS AND INCREASE PRODUCTION WITH CONSTANT-SPEED DRIVES IN THE PAPER INDUSTRY . . .

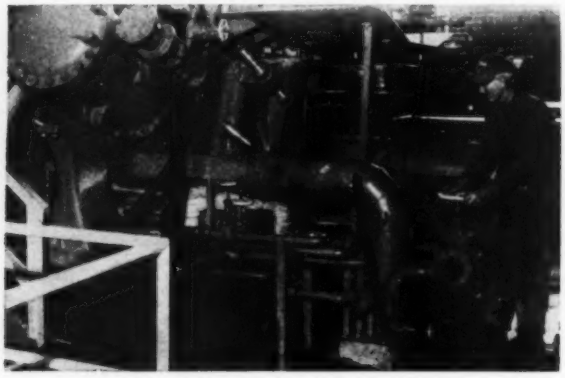
Here is a picture tour of the pulp and paper industry indicating the broad variety of applications now being made of E-M synchronous motors . . . visual proof that E-M synchronous motors are best for constant-speed drives . . . and in pulp and paper mills that means everywhere.



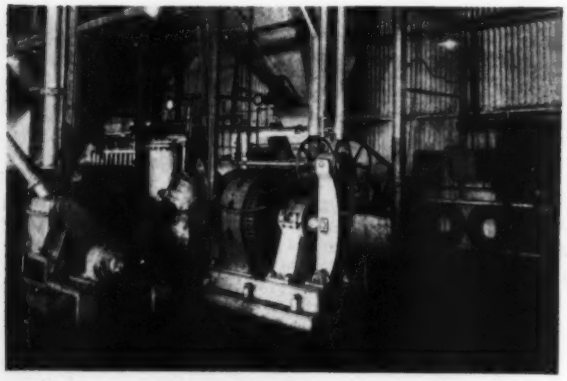
1. **Chipper** of highest capacity being driven by a 1500 hp. E-M synchronous motor specially designed to withstand shock and vibration. Chippers are used in making chemical pulp and this one reduces 33 inch logs, 20 feet long, to chips in 15 seconds.



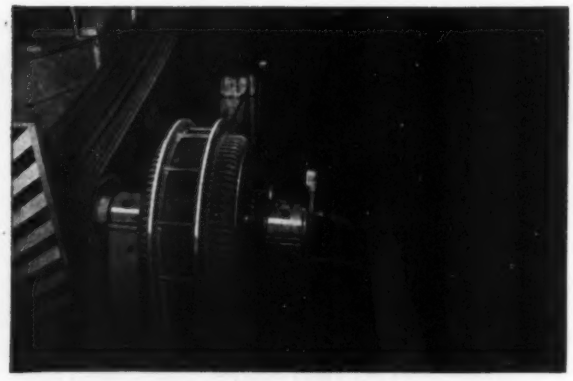
2. **Grinders** are used in place of chippers, if groundwood pulp is made in the plant. At the new modern mill of the Armstrong Cork Company, Macon, Georgia, heavy-duty E-M synchronous motors with their inherent power factor correction, deliver 3000 hp. each at 240 rpm to the . . .



3. Pocket-type pulp **grinders** in which hydraulic rams press the logs against wet grindstones. After grinding or chipping and digesting, the pulp must be broken up into fibres by a combination of machines such as . . .

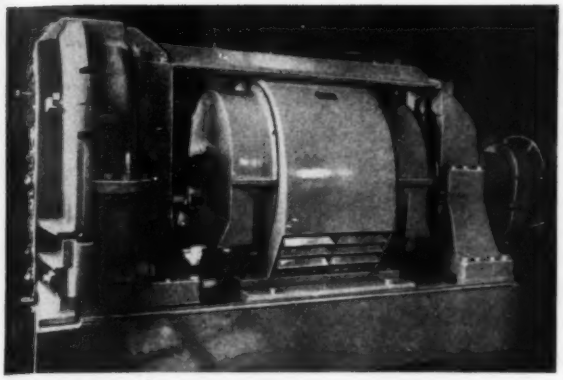


4. a **defibrator** driven at steady speed by a 250 hp. 600 rpm synchronous motor reduces wood fibres for the Johns-Manville Corporation at Waukegan, Illinois. Defibrators driven by synchronous motors are widely used in the wood processing industry . . . or . . .



5. a **beater**, such as this Shartle Beater, driven by a 200 hp., 450 rpm pedestal-bearing type E-M synchronous motor reduces pulp into useable material for the Schmidt and Ault Paper Company at York, Pennsylvania. Defibrating or beating the pulp is followed by . . . .

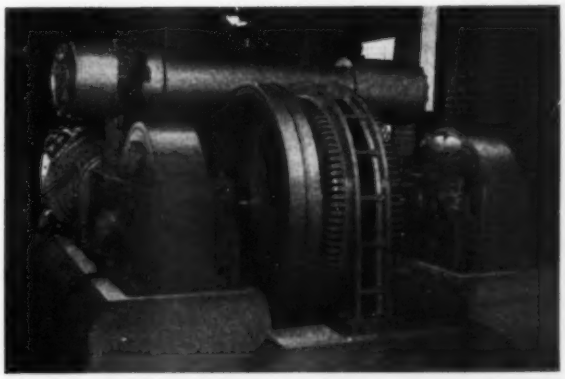
E-M SPECIALISTS IN



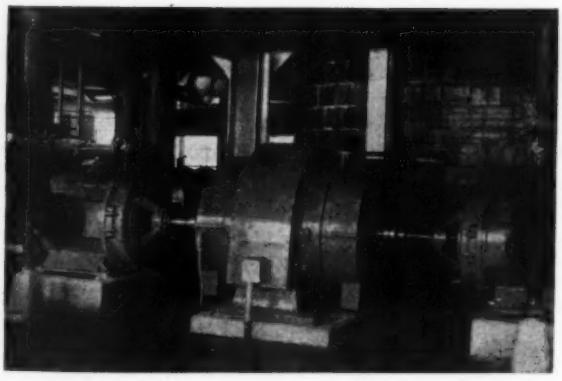
6. a refiner. In this paper mill installation a 400 hp. synchronous motor of splash-proof construction provides a dependable drive for a Sprout-Waldron refiner. In many plants an operation closely linked to the refining is performed by . . .

7. a Jordan. The steady speed that keeps power consumption low along with protection against splashing liquids is provided in the 350 hp. splash-proof E-M synchronous motor driving a Jordan in the Southland Paper Mill. And to move the product along . . .

8. Booster Pumps like these horizontal centrifugal pumps operating along the line in the Southland Paper Mill are always powered evenly regardless of the load by three 400 hp. heavy-duty splash-proof E-M synchronous motors.



9. Air compressors are also driven by direct-connected synchronous motors. Plenty of air-pressure is nearly as useful as water in a paper mill. In the Southland Paper Mill a 200 hp. 300 rpm engine-type synchronous motor keeps the compressor going.



10. Vacuum pumps used frequently in the pulp and paper industry are also advantageously driven by synchronous motors. The pumps shown are in the Southland Mills at Lufkin, Texas, and are provided the steady power required by 250 hp., 400 rpm, splash-proof E-M synchronous motors.

THIS PICTURE RECORD shows how you can cut costs and insure steady production by a wider use of E-M synchronous motors, with their stability, their simplicity, their power factor improvement and economical use of power.

Let us help you harness your drives to these economical reliable synchronous motors. We build synchronous motors for your requirements. Our field representatives are glad to analyze your operating needs.

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SYNCHRONOUS MOTORS
FOR MORE THAN 40 YEARS

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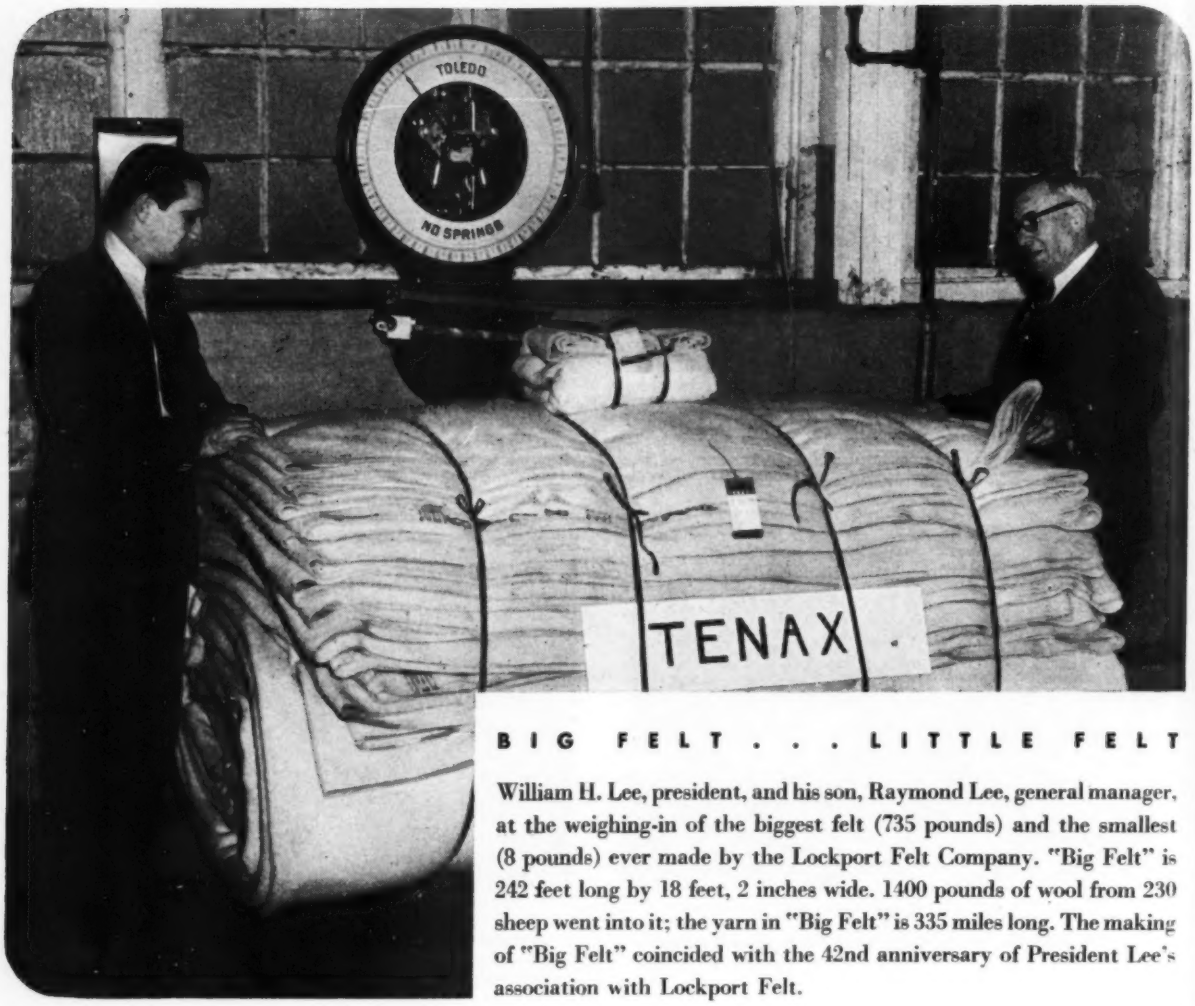

BIG FELT . . . LITTLE FELT

William H. Lee, president, and his son, Raymond Lee, general manager, at the weighing-in of the biggest felt (735 pounds) and the smallest (8 pounds) ever made by the Lockport Felt Company. "Big Felt" is 242 feet long by 18 feet, 2 inches wide. 1400 pounds of wool from 230 sheep went into it; the yarn in "Big Felt" is 335 miles long. The making of "Big Felt" coincided with the 42nd anniversary of President Lee's association with Lockport Felt.

OUR EXPERIENCE— YOUR BENEFIT IN LOWER COSTS

Our experience we pass on from father to son—the benefit of that experience, we pass on to you. For 57 years we have been gathering knowledge and the ability to choose the best wools and make them into the best felts—for you to make better paper at lower costs. For TENAX felts are tough—they have the strength of superior production, built of more than a half century of experience. These tough, long lasting felts lower your operating costs—that is your benefit of our experience.

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"TENAX FELTS ARE TOUGH"

Serving the paper industry since 1891.

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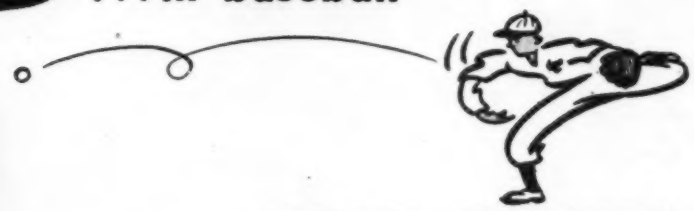
...in baseball



...and in VALVE MANUFACTURE

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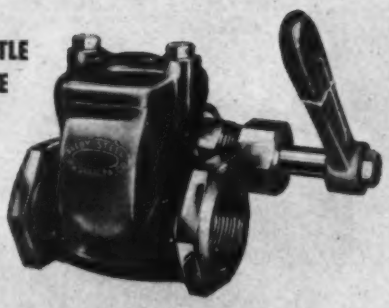
No. 331

ALOYCO
GLOBE CHECK VALVE
No. 45A

ALOYCO
LEVER THROTTLE
GATE VALVE
No. 120



● The best pitcher in the big leagues would probably be only a second-rate catcher. This specialization in professional baseball is equally sound in the manufacture of corrosion-resistant valves. In order to make the very highest quality valves of stainless steels and related alloys, we have found it necessary to focus the entire facilities of our organization on this one product. We make nothing but valves—and we make them of nothing but corrosion-resistant alloys. The peculiarities of these metals make it necessary for the valve manufacturer to have long experience in their handling, to obtain maximum results.

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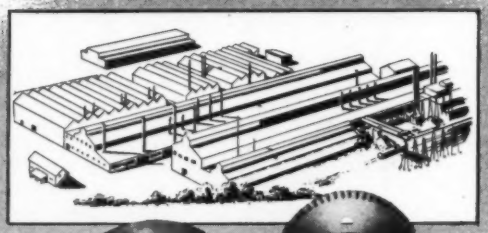

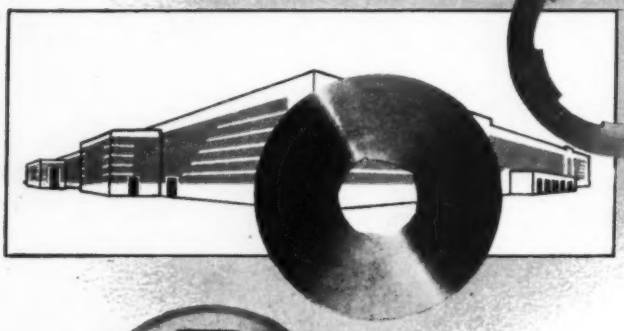

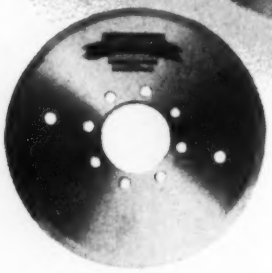

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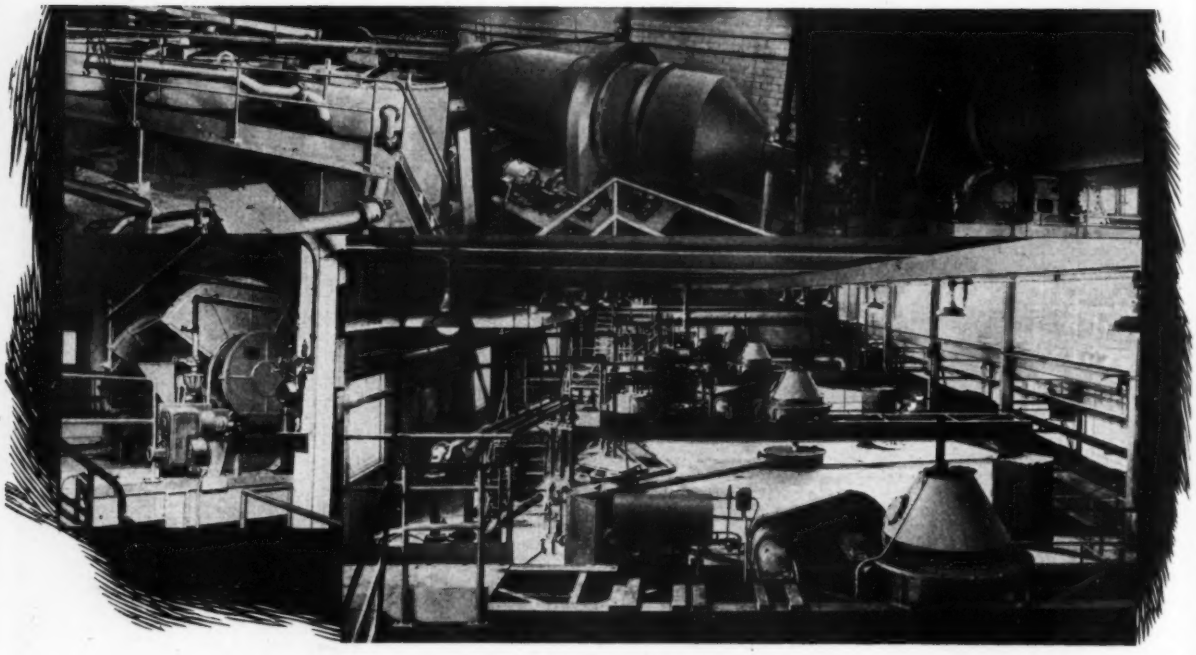

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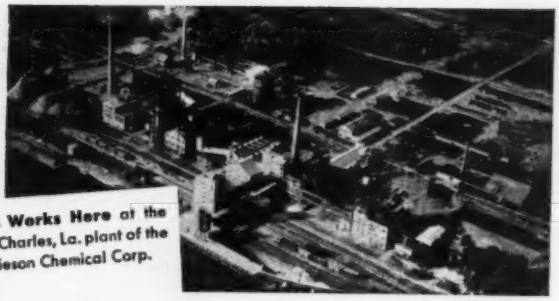
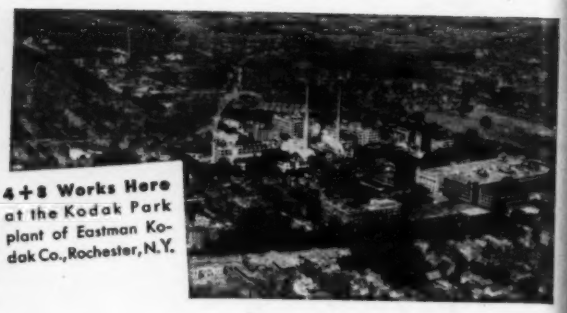
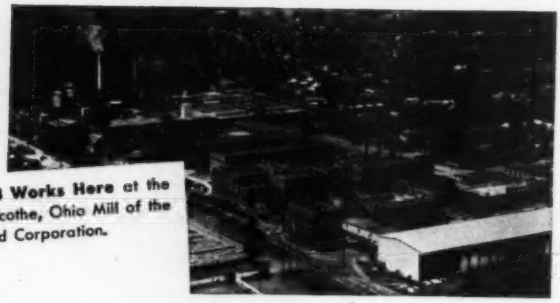


4+8 Works Here at the Lake Charles, La. plant of the Mathieson Chemical Corp.

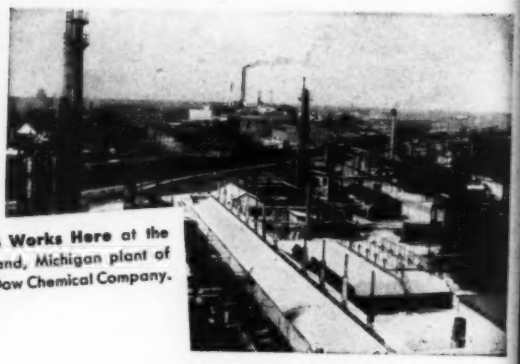


4+8 Works Here at the Kodak Park plant of Eastman Kodak Co., Rochester, N.Y.

alkali OR FILMS



4+8 Works Here at the Chillicothe, Ohio Mill of the Mead Corporation.



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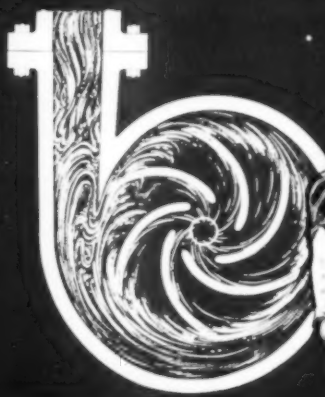

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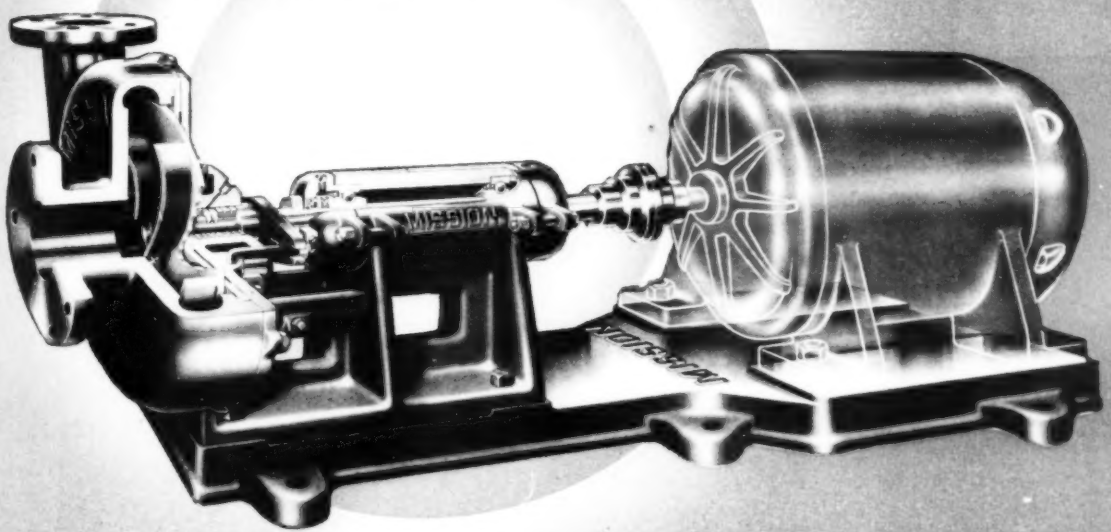

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. . . have a *mission* . . . to save you money!

To ask a JORDAN to do a good job of hydrating and brushing—a job for which it is ill-designed—is like trying to force a square peg into a round hole.

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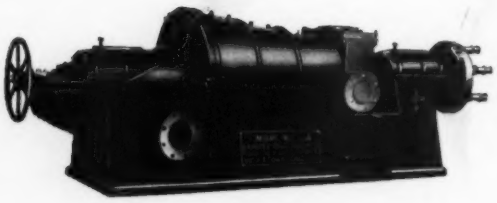
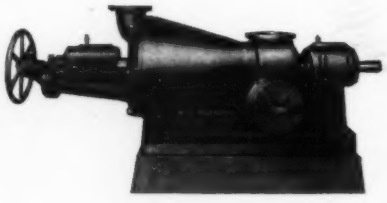
BALANCED REFINING IS THE THING
—SO, WRITE SHARTLE OR DILTS.





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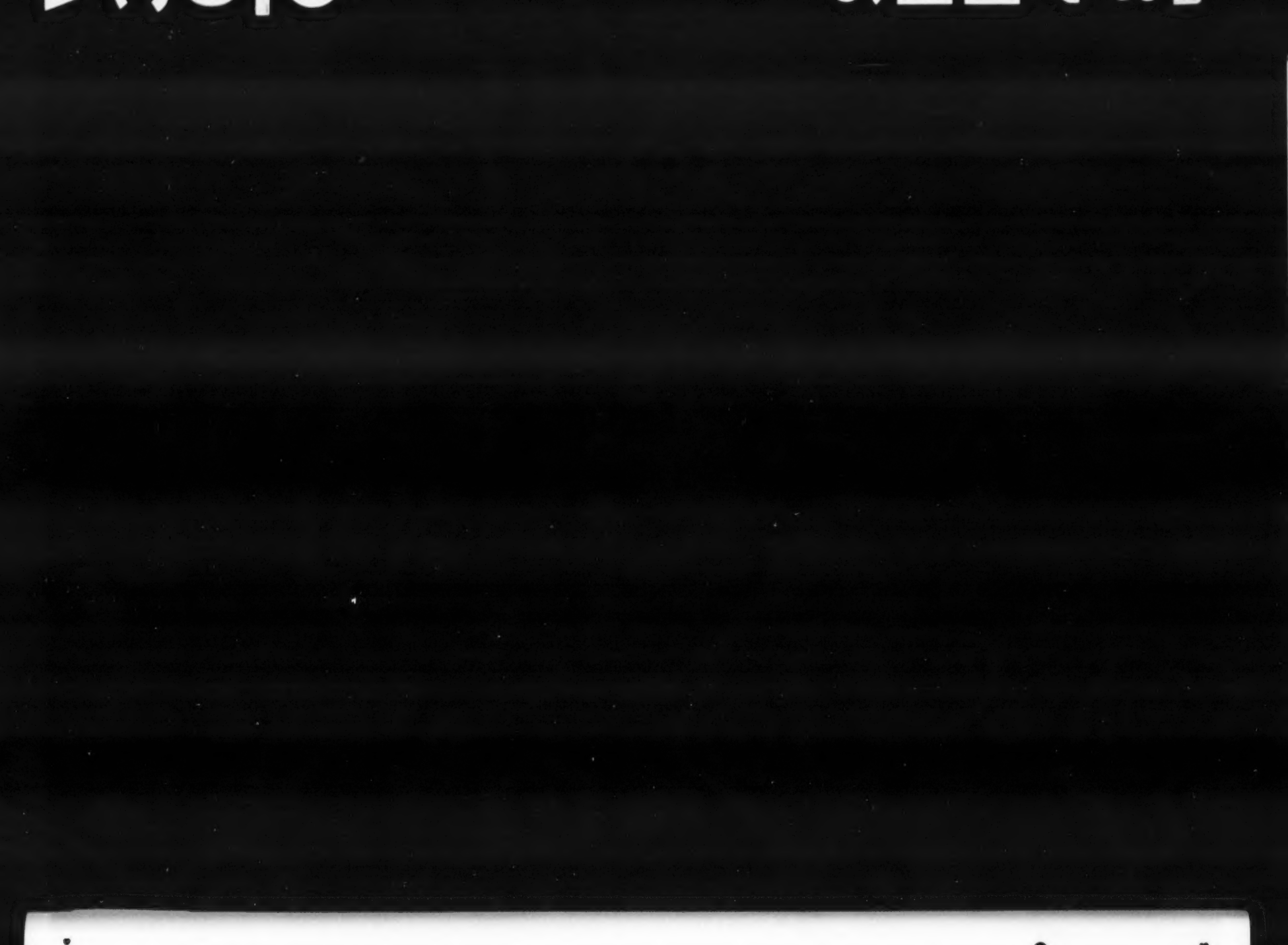

...and pick the NOPCO* WAX SIZE that suits you best!

With the introduction of Nopco 2251-X, Nopco now offers you the *convenience* of *3*— instead of *2*—*economical* Wax Sizes. Regardless of which one you select, you'll get intimate wax dispersion *through* the fibres...positive wax retention on the fibres...high sizing efficiency at low sizing cost for your paper, paper board and fibre insulation board products.

Take your pick of.:::

1. New Nopco 2251-X

ADD NO WAX . . . ADD WATER ONLY

This new *anhydrous* wax size is a *one-package* product, prepared for easy handling in the mill. Contains the perfect balance of wax and emulsifier. Effects substantial freight savings over finished emulsion type. A creamy white, waxy solid packed in 70-lb. corrugated cartons.

2. Service-Proved Nopco 2251-B

ADD WAX AND WATER

This *anhydrous* emulsifier is formulated to carry the greatest amount of paraffin wax consistent with good emulsion stability. Makes an emulsion stable from an infinite dilution up to 70% solids. You save on freight here, too. A light tan, waxy solid packed in 70-lb. corrugated cartons.

3. Popular Nopco 2252

NOTHING TO ADD . . . A READY-TO-USE EMULSION

Especially designed for mills with small requirements or limited mixing facilities. A heavy cream-colored liquid 50% solids. Packed in 55-gal. returnable steel drums.

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NOPCO WAX SIZES

The Big Swede Isn't Jealous

Big Swede at left. New brother . . . or sister (?) . . . at ri

A Blessed Event has taken place at the Rhinelander Paper Company in Rhinelander, Wisconsin, but the Big Swede's New Brother has not yet been given a name. The Company points with parental pride to its No. 7 son and has offered considerable cash for a suitable name. Probably never before has there been such a personalized paper machine. The contest is over, but entries still come in. Very soon someone will be rewarded for having sent in a name that is chosen.

Pa

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TRADE WINDS

Paper Production and Sales Value UP! First Half of Year

▸▸▸ NEW RECORDS were set by the pulp and paper industry during the first six months of 1948, when the total sales value of all products amounted to $3,043 million, according to the August Pulp and Paper Industry Report of the Department of Commerce. The report states that this figure is more than $1 billion above that for the first half of 1946, and $234 million higher than the figure for the first six months of last year.

W. L. Neubrech, pulp and paper specialist, Office of Domestic Commerce, stated that while sales in terms of value reflect price increases in pulpwood, wood pulp, paper, board and products, there was also a substantial gain in physical output of paper and paperboard. As a result the first six months of 1948 established an all-time production record. Production in the first half of 1948 of all types of paper and board amounted to 11,146,000 tons, an increase of 6 per cent over the same period of 1947 and 18 per cent over the first six months of 1946.

The pulp and paper industry continues to be a leading factor in the foreign trade of the United States, Mr. Neubrech said. Imports of pulpwood, wood pulp, newsprint, and to a lesser extent of other classes of paper, board and products, amounted to $378 million in the first six months of 1948, compared with $287 million in the same period of 1947.

United States exports, on the other hand, continue relatively small and amounted to only $75 million for the first half of this year, compared with $84 million for the same period of 1947. Many of the larger U. S. paper exporters state that exports this year would have much greater if dollar exchange in principal foreign markets had not deteriorated to the extent of requiring import restrictions on most grades of paper, board and products. Loss of such markets in Canada, Latin America, and Far Eastern areas will not be offset by increased purchases of European countries through the use of ECA funds. It is believed that only small quantities of paper, board or products of U. S. manufacture for European destination will be procured under the foreign aid program.

The end of the first half year appears to mark a more or less complete readjustment in the United States pulp, paper and allied products industry, according to the report. Trade reports from Department of Commerce field offices indicate that the general market situation is solidifying, following the considerable uncertainty prevailing since early in the year. The maiority of manufacturers, converters, and wholesalers again look for a steady volume of business during the remainder of 1948.

Certain underlying conditions have changed materially from six months or a year ago. Mill inventories of basic raw materials, including pulpwood, wood pulp, and wastepaper, are considered highly satisfactory as of the end of June.

In the case of market wood pulp, inventories in the hands of paper and paperboard mills at the end of June totaled 539,000 short tons, a gain of nearly 57 per cent over the end of June, 1947. These stocks represent 60 days requirement on the average. Imports of wood pulp in the first half of this year totaled 1,202,000 short tons, against 1,023,000 in the first six months of 1947. Thus, the principal difficulty of many nonintegrated paper mills during the war, and up until recent months, has been largely overcome.

The industry's general position is further reflected at the wholesale distributor's level. Total value of sales for the first half of 1948 is estimated at $756 million, compared with $736 million for the same period of 1947 and $589 million in the first six months of 1946. Wholesale paper merchants' inventories continued their rapid rise through the first five months of 1948, but experienced a slight decline in June (1.3 per cent). Current field office reports point out that merchant stocks are now considered good and generally in balance, with purchases being made only to replace stock sold, and in a few instances to build up stocks of items which have been scarce until recently. Merchants state that most supplying mills have abandoned allocation systems entirely, with others expecting to follow suit in August or September.

Like manufacturers, wholesalers are optimistic regarding a steady market for the remainder of this year, but observe a return to prepar competitive conditions in terms of quality and service.

Mr. Neubrech pointed out that while there have been some price advances by both mills and distributors recently, the general price level has remained relatively stable. One particularly interesting development is that, even in view of competition, most manufacturing mills have seen fit to reduce their weekly production time, rather than attempt to cut prices in order to obtain

a larger volume of business, as was customary in prewar years. Increasing costs of operations in terms of labor and raw materials have placed the break-even point for many mills on such a high level that it is more feasible to reduce the work week and, therefore, their production, than to lower prices.

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NEW HOLYOKE PLANT WILL MAKE PULP FROM COTTON

The new Holyoke (Mass.) plant of Cellulose Fibres, Inc., with 40 workers employed in the preparation of pulp for paper mills is ready to begin production. As soon as the plant has begun operations, the working force will be expanded to initiate a supply of pulp to mills within a 25-mile radius of Holyoke. As time and production progress, the field of service will be greatly enlarged and more employees will be taken on.

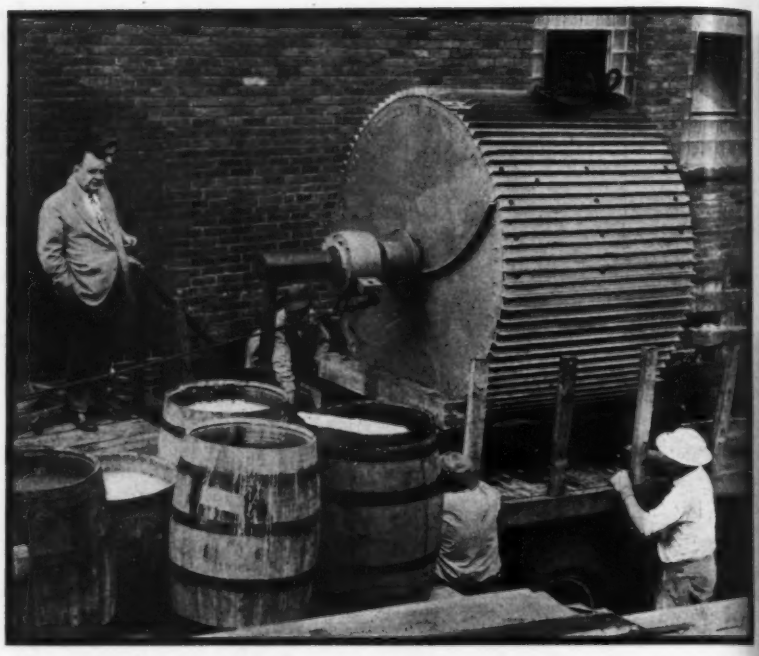
The new plant will deal in cotton pulp for paper mill consumption. The product will be prepared for use in conjunction with wood pulp, or use by itself, to minimize, and in some cases even to eliminate, rag preparation in paper mills. Only raw cotton waste, secured from domestic and foreign sources, will be used.

During recent weeks, machinery, including a washer-beater weighing over 30 tons, has been arriving from Osborne Paper Mill Supply Company of Fulton, New York. The location of the plant is in a former mill of the American Thread Company at 549 Main Street, Holyoke, and the machinery has been installed under the supervision of Robert W. Pattison, president and general manager, and Joseph N. Barowsky, treasurer, of Cellulose Fibres, Inc. Mr. Pattison is widely known in the paper industry, having been employed in executive positions by American Writing Paper for the past 25 years. Early this summer he resigned the superintendency of American Writing Paper's Riverside Division mill to launch Cellulose Fibres, Inc.

With a view to assuring a supply of clean water of good quality, gravity and filter beds leading from the building into the adjacent canal have been overhauled.

The company's officials have set a policy of using only long staple cotton waste. This will give the concern a cleancut advantage over competitors inasmuch as the Holyoke product will be entirely free of synthetic resins now used widely in textile manufacture from which much rag-content stock is obtained by paper mills. Paper mills, in return, will reap an advantage from this policy. An added advantage in mills will be the minimizing of the old-time process of rag-stock digging.

The company expects to draw upon Holyoke's supply of experienced paper mill workers for its production staff.



A 30-ton washer beater to be used for preparing pulp from cotton waste is delivered at Cellulose Fibres, Inc., at Holyoke, Mass. Robert W. Pattison, president and general manager of the company looks on

▼

BRITISH PAPER NOTES (July, 1948)

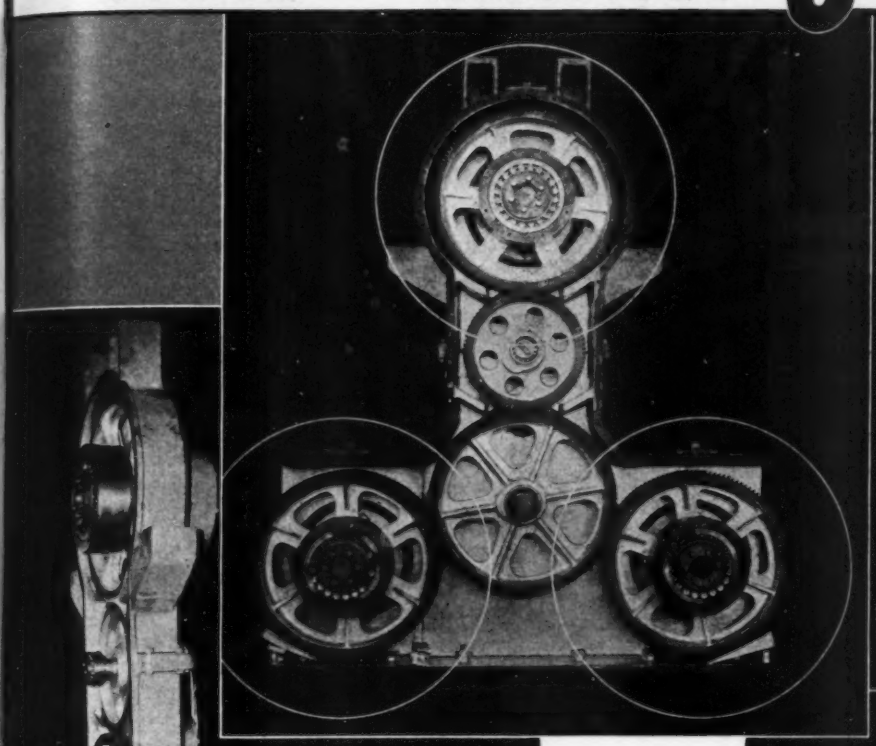
The present position in the British Paper Trade is shown in its simplest and most understandable form by the latest government returns covering the first half of this year. This discloses that despite the stringent financial position of this country and what we were led to expect would be the effect of the prolonged drought in the Northern European countries stretching over last summer, winter and spring, the actual imports of papermaking materials were at the rate of 71 per cent of prewar and 137 per cent of last year. The total for the half year was 724,480 tons against 528,054 tons during the same period of 1947. The chemical, dry, bleached wood imports totaled 115,605 tons, approximately 23,000 tons up on 1947, and the chemical, dry unbleached at 200,309 tons are 30 per cent higher than last year. Mechanical, dry wood at 126,349 tons is over 44,000 tons in advance of 1947 and receipts of esparto grass now register 190,328 tons, over 37,000 tons up on 1947 and 126 per cent of the prewar rate of importation. Rags, with 13,286 tons, are nearly double both last year and prewar and "other sorts of materials," 21,882 tons, are actually 17,754 tons greater than in 1947.

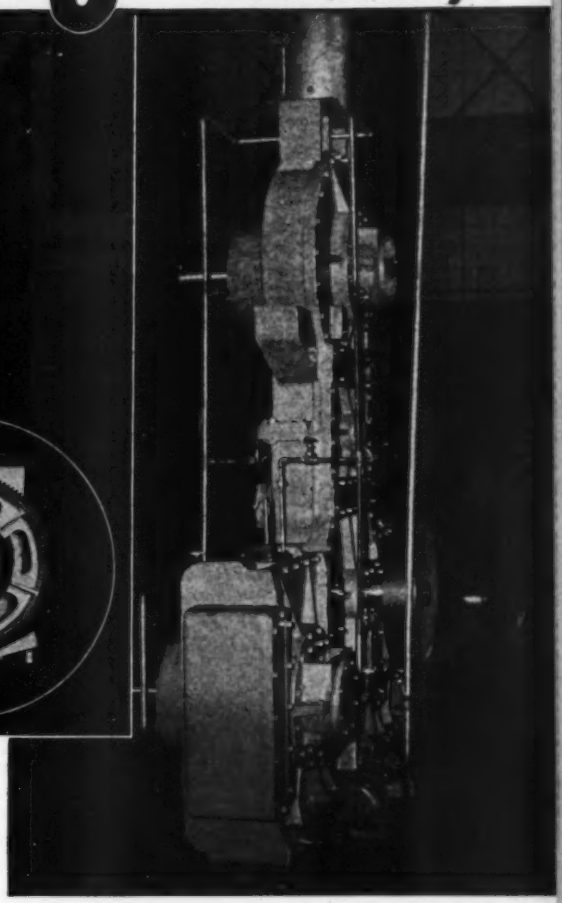
With this surprising increase in material receipts it is interesting to note that Finland has sent 150,394 tons against 98,659 tons last year, and Sweden, with 194,558 tons, is approximately 6,400 tons up, while Norway has doubled her 1947 exports to this country with a total of 62,770 tons. From North America we find that Canada last year sent 35,635 tons and this year 72,099 tons, while Newfoundland has moved up from 8,293 to 13,122 tons.

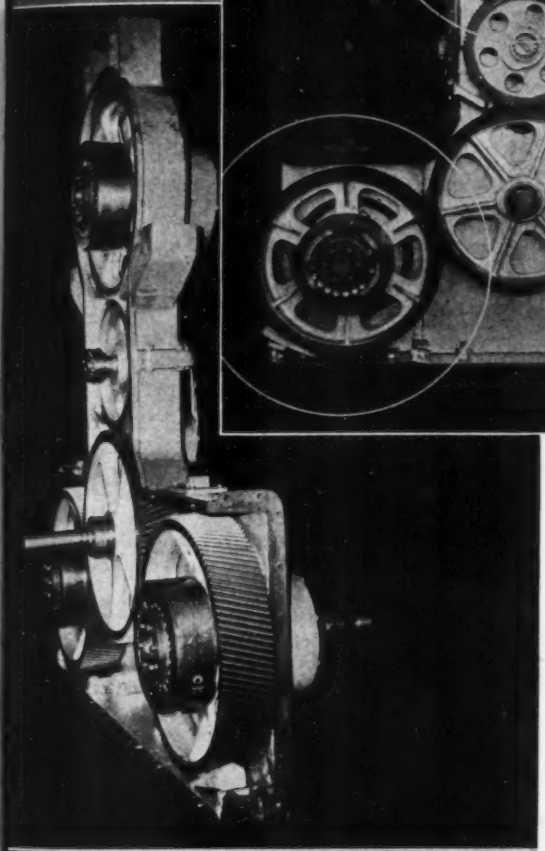
Total of exports of paper and board for the first six months of this year are 58,013 tons, only 4,200 tons above last year, and imports and paper and board are slightly down on last year at 222,765 tons. Incidentally, among the countries responsible for these imports it is seen that Czechoslovakia has moved up from 936 to 3,231 tons but perhaps the most interesting return is that for the U.S.A., which last year was 3,057 tons and this year 14,313 tons, nearly equal to the prewar figures. It is recorded that just under 50,000 tons of newsprint has been received, approximately 25 per cent of the prewar rate, which with home production now at 35 per cent, representing 280,000 tons per annum, it is probable that this section of the industry will have at its disposal about 30 per cent of prewar supplies during 1948.

The recent publication of the news that America is absorbing 65 per cent of the world's newsprint production,

PAPER · · · America's 6th Industry







HIGH SPEED DRYER DRIVE

Here is the latest high-speed drive for drying cylinders—smooth flowing power . . . setting new production records on the latest Puseyjones Machines.

Operated in shop test at equivalent paper speeds up to 4,000 feet per minute with minimum oil temperature rise, and without vibration or back-lash.

Check these important improvements:

(1) Each idler gear supported by two heavy-duty bearings;
(2) All gears dynamically balanced;
(3) Interior channelways for delivering oil direct to each idler gear;
(4) All outside cover plates may be removed in sections for convenience when replacing gears and bearings;
(5) Dryer bearings located outside dryer gears for easy removal.

The new high-speed Dryer Drive is another outstanding development of Puseyjones, complementing the "Rapi-Drape" Wire Changer, the Flow Spreader, the "Simplex" Press Part, the Stream Flow Vat System, the Stream Flow Cylinder Mould and the improved Steam Joint. For the latest Fourdrinier Machine, Cylinder Machine, Yankee Machine, or a modification of any of these types – see Puseyjones first.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK

coupled with the announcement by the British Government that they "regard it as their chief objective to increase the size of newspapers as early as possible and certainly in 1949 if that can be achieved without sacrificing food and raw materials essential to industrial production" draws attention to the recently published pamphlet, entitled *Newsprint,* issued by the Newsprint Supply Company.

This is an interesting pamphlet and presents not only an outline of the effects on the Press of the newsprint shortage during the war, but what is perhaps more interesting, the evidence given by the Newsprint Supply Company to the Royal Commission on the Press. It is shown by one of the Supplementary Statements that no section of paper consumers is at present receiving such a small quota of supplies as the newspapers (the extremes being: newspapers 31 per cent and government departments 158 per cent of prewar. During the greater part of the war period newsprint production in this country was down to 18 per cent, or 144,000 tons, against 800,000 tons prewar).

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MACON KRAFT CO. WILL INSTALL EQUIPMENT TO ELIMINATE BAD ODORS

Steps are being taken toward the elimination of objectionable odors from the Macon Kraft Company's paper mill, a joint committee of Macon citizens and Macon Kraft officials revealed in late August.

Officials of the company announced that new equipment will be installed at the paper mill which is expected to eliminate the greater portion of the odors.

R. H. Save, vice president of the Mead Corporation, parent to the Kraft Company, and Dr. George H. Sheets, assistant director of research for the organization, sketched plans for citizens showing how the process used destroys gaseous odors which pass through a lime kiln heated to nearly 2,000 degrees. Officials said the equipment could be installed by next spring if steel is available.

The new steps toward eliminating odors came after citizens formed a committee protesting against the odors cast over Macon by the Kraft mill, which was put into operation several months ago.

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CAREW CO. PLANT SOLD— OLDEST IN HOLYOKE AREA

A manufacturer of fine writing paper for more than 100 years and oldest of the paper mills in the Holyoke area, the Carew Manufacturing Company, of South Hadley Falls, Massachusetts, was sold recently to Texon, Inc., of Russell, Massachusetts, manufacturers of paper-base materials for the shoe industry. The Carew mill had been idle for several weeks, with its 150 employees laid off, during the negotiations. Texon, Inc., was organized a year ago and began operations in the old Chapin-Gould paper mill in Russell which it had purchased from the du Pont interests in September, 1947.

Representing the Carew stockholders in the negotiations was Constant Southworth, president of the Hampshire Paper Company. Mr. Southworth is a cousin of the late Courtlandt S. Griffin who was president of the Carew company until his death recently.

New officers of the Carew Manufacturing Company are: president, David B. Schoales, who is treasurer of Texon, Inc.; clerk and treasurer, Earle H. Sylvester; vice presidents, Morgan J. Vittengl, who is president of Texon, Inc., Jay J. Uber, and Dennis F. Mulvihill.

The Carew mill's two machines, 80 inches wide with a trim of 70 inches and a rated capacity of 24,000 pounds in 24 hours, will be changed to the manufacture of the Texon fiber, which is used as a coating base for imitation leathers. A saturator will be installed on one of the machines immediately, while a second saturator will be added later to the second machine. This equipment will be used in the impregnation process.

Since Texon started operations in Russell last year, improvement and development of the product has been such as to demand expansion of facilities. Among the impregnated products to be made at the Carew mill will be a new innersole material which is about to be announced to the shoe industry.

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EXPANSION AT EASTMAN TO INCREASE MANUFACTURE OF PHOTOGRAPHIC PAPER

Plans for the construction of the first unit, at an estimated cost of $501,500, of a projected three-unit building to increase facilities for manufacture of photographic paper at Kodak Park were filed with the city August 19 by Eastman Kodak Company, Rochester, New York.

The initial unit, construction of which will begin immediately on vacant land, will front 342 feet and will be 71 feet deep and 60 feet in height. It will be a three-story building with basement and a penthouse which will contain fans and motors for ventilation.

On completion of unit 1, an outmoded adjacent one-story and basement building now used for making photographic paper will be razed and will be replaced by the second unit, which, it is indicated, probably will be larger than the first. The second unit is not expected to be built until next year. If it is decided to build the third unit, the entire structure will be more than 250 feet in depth and will cost, it is believed, more than $1,500,000. Water will be supplied from the company's own main.

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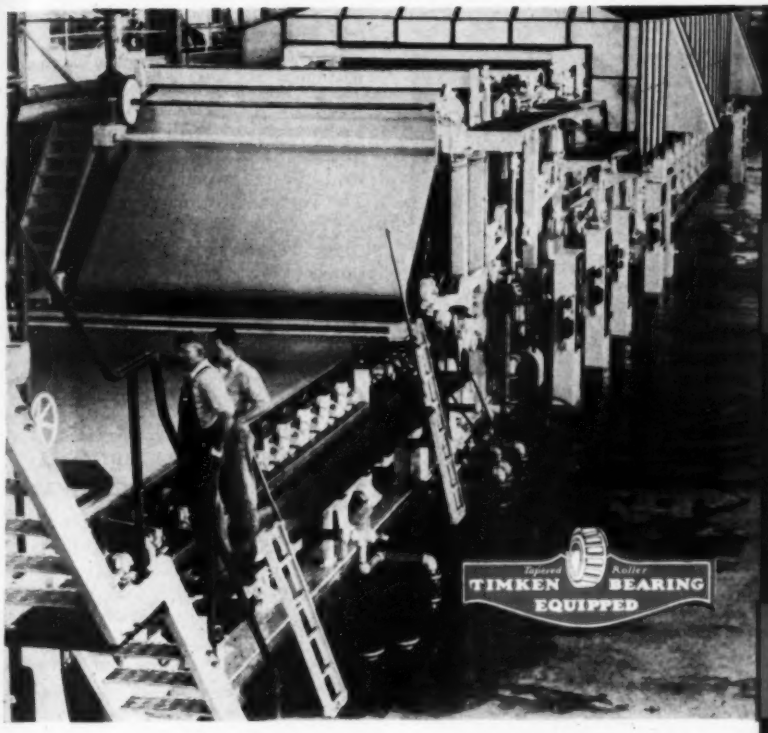
▶▶▶ CONTRACTS have been signed for erection of a new manufacturing plant for Dixie Cups at Brampton, Ontario, by the Dixie Cup Company (Canada), Ltd. Construction work will begin immediately, and the new plant is scheduled for completion within a year, including the installation of machinery.

Mill of Carew Manufacturing Co., South Hadley Falls, Mass., recently was sold to Texon, Inc. At right is the Stevens Paper Co., formerly Hampshire Paper Co. mill, in which Old Hampshire Bond was made before Carew took over its manufacturing some years ago

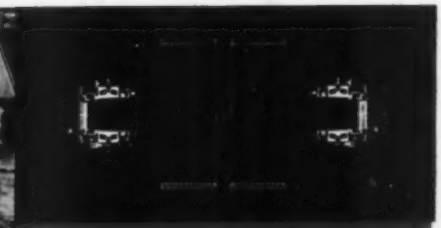


Another New Fourdrinier Machine Goes On TIMKEN® BEARINGS

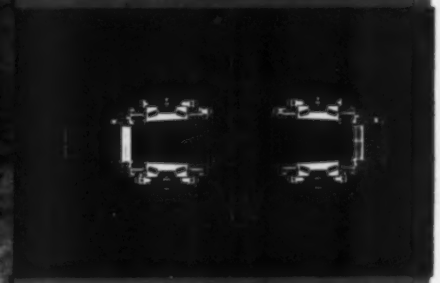
The photograph shows a new paper machine built by the Black-Clawson Company, Hamilton, Ohio and installed recently at Fernstrom Paper Mills, Inc., Pamona, California for the production of fruit wrap paper.

Timken tapered roller bearings are used throughout the 160" Fourdrinier on top press rolls, bottom press rolls, pressure rolls, wringer rolls, breast rolls, felt rolls, and wire rolls. They assure smooth, friction-free operation; prolong the lives of felts and wires; hold rolls in alignment; simplify lubrication; and reduce power consumption.

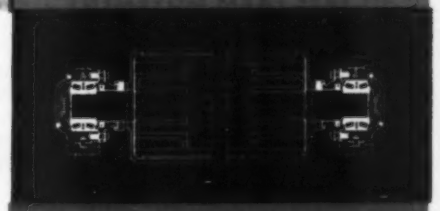
Black-Clawson is one of the oldest users of Timken bearings in the paper machinery industry. They know from experience that no matter how good any machine may be, it is a still better machine when it is Timken bearing equipped. Remember this when buying new equipment. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "Timrosco".



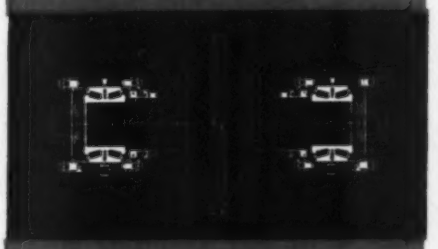
Application of Timken bearings on top press rolls.



Application of Timken bearings on bottom press rolls.



Application of Timken bearings on wire, felt and breast rolls.



Application of Timken bearings on pressure rolls and wringer rolls.

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →✳←

Tree Farm Movement Growing

Governor William Preston Lane, Jr. (left), presents Maryland's first "Tree Farm" certificate to P. H. Glatfelter, president of the Glatfelter Pulpwood Co., Spring Grove, Pa. Participants shown (L to R): Governor Lane, Mr. Glatfelter, U. S. Representative Lansdale Sasscer (Md.), and State Senator James B. Monroe

MARYLAND IS 21ST STATE IN TREE FARM MOVEMENT

Maryland became the twenty-first state to join the American Tree Farm movement with the dedication July 30 of a 1,278-acre tract of forest land in Charles county owned by the Glatfelter Pulpwood Company (Spring Grove, Pa.).

The gold seal Tree Farm certificate was presented by Governor William Preston Lane, Jr., to P. H. Glatfelter, company president. The dedication of its Maryland forest property brought to three the number of states in which the company operates certified Tree Farms. In October, 1947, the company became the first Pennsylvania Tree Farm owner when a 600-acre woodland tract at Iron Springs was certified and during July of this year the company had a 524-acre tract at Hanover, Virginia, certified as a Tree Farm.

According to Joseph F. Kaylor, director of the State Department of Forests and Parks, the Tree Farm program is part of a plan to increase and perhaps ultimately double Maryland's annual $9,000,000 income from forest products. The American Tree Farm movement, which started in the State of Washington in 1941, today includes more than 15,000,000 acres of woodland.

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VIRGINIA TREE FARM IS DEDICATED BY PAPER CO.

The recent dedication of a 129,000-acre tree farm, owned by the Camp Manufacturing Company, of Franklin, Virginia, has brought the newly-organized Virginia "Tree Farm" system to a total of 186,183 acres. It is sponsored by Virginia Forests, Inc. Cooperating agencies include the Virginia Forest Service, the Extension Service of the Virginia Polytechnic Institute, and the Soil Conservation Service. The Southern Pine Association has given direct assistance. National co-ordinator of the American Tree Farm System is the American Forest Products Industries, Inc., Washington, D.C.

The Camp Manufacturing Company has been doing business at the same stand for 60 years. Today, it produces some 30 million board feet of lumber a year, and consumes 150,000 cords of pulpwood in its pulp mill. The company estimates that about 30 per cent of its sawlogs and pulpwood come from its own land. Its sawtimber growth today has been computed at 150 to 175 board feet per acre each year, and its pulpwood growth at about one-third cord per acre.

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2¼ MILLION SEEDLINGS PLANTED BY W. VIRGINIA PULP AND PAPER COMPANY

About 2¼ million pine seedlings were planted in North and South Carolina by the West Virginia Pulp and Paper Company during the 1947-48 planting season, it was reported recently by company officials. The planting, which was carried out between November and March and covered ten counties of the two states, was completed successfully despite weather conditions which consistently hampered operations. Out of a total of 85 work days allotted to the planting program, 24 were lost because of heavy rainfalls. Although the bulk of the work was done by hand, a planting machine was used to good advantage when con-

Receiving Tree Farm certificates at the forestry meeting held in the Bigwoods Experimental Forest near Franklin, Va., were: (left to right): J. H. Johnson for Ellis Olsson, 999 acres; Clinton L. Williams, 1725 acres; J. M. Camp for Camp Manufacturing Co., Inc., 129,000 acres; A. W. Showalter, 20 acres; Rudolph Wachmann, 1550 acres; and L. L. Thorpe, 356 acres

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ditions permitted. Five hand-planting crews, totaling 65 men, planted about 3,300 acres and about 330 acres were planted by machine.

The company planted loblolly, slash, longleaf, and spruce pine in a variety of sites, including cut-over woods, good farm land, wet boggy areas, dry ridge tops, coastal plain swamps, Piedmont hills, crawfish flats, scrub oak ridges, heavy clay soils, and deepest sands.

The company announced that preliminary plans had been drafted to continue the planting next winter in the Carolinas as part of its long-range program of reforestation and conservation. In addition to the planting of seedlings, the company is endeavoring to develop a direct seeding technique for use in areas where handling of planting equipment is difficult.

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11,000-ACRE MEMORIAL FOREST IS DEDICATED

The largest community-owned forest in the nation was dedicated on Labor Day, September 6.

The Oneida County (county seat, Rhinelander) Memorial Forest now totals 11,000 acres. The movement began in 1945, and in 1947 the Oneida County Board voted to establish a 10,000 acre memorial forest. Since that time, 1,000 acres have been added. Ten thousand trees were planted by county residents this spring.

Speakers at the dedication ceremonies were: Marvin Beltz, chairman of the Memorial Forest Committee; Charles F. Smith, chairman of the State Conservation Commission; and Folke Becker, president of "Trees for Tomorrow, Inc.," and president of the Rhinelander Paper Company.

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▶▶▶ MORE THAN 1,000,000 pine seedlings will be given away to Louisiana farmers this winter by the Southern Advance Bag and Paper Company, Hodge, Louisiana, with only the understanding that they will be properly planted and protected from forest fires. The demand for the seedlings is expected to exceed the supply, and thus farmers living on the lands from which the mill draws the bulk of its pulpwood will be given priority.

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▶▶▶ MANUSCRIPTS for the completely revised Fourth Edition of *The Manufacture of Pulp and Paper* are showing steady progress, according to the Joint Textbook Committee of the Paper Industry. Much material is already in the hands of the publishers, McGraw-Hill Book Company, and the new volumes will begin to appear in 1949.

NEKOOSA MILL'S NO. 4 MACHINE IS MODERNIZED

A completely rebuilt and remodeled No. 4 paper machine at the Nekoosa mill of the Nekoosa-Edwards Paper Company is now turning out fine printing papers of improved quality and printability. Increased drying capacity has been achieved in the main section of dryers by the installation of additional dryers. A size press has been added to the machine to permit the manufacture of surface-sized fine papers. A second dryer section has been installed after the size press for the purpose of drying the paper after the tub-sizing treatment.

The calender stack at the end of No. 4 machine has been rebuilt, and the over-all length of the machine has been increased by approximately 60 feet. A modern ventilating hood is positioned over the new dryer section. Rope carriers are now provided for carrying the paper through the main dryer section. In addition to the above additions and improvements, a bank of 13 vortraps has been installed along the back side of the wet end of the machine for stock cleaning purposes. This installation alone is accounting for a great improvement in the cleanliness and quality of the papers produced on the machine.

Drying in each section of No. 4 is now controlled by a modern moisture control unit. Additional plans for further improvement of the machine call for a new rubber-covered spiral-drilled suction press, a center wind drum reel, and a new winder. These improvements will be effected step by step in order not to result in a material loss of machine time. Rebuilding of the fourdrinier is also being planned.

The entire job was completed in nine working days. The machine was idle only from March 21 until it commenced operation on March 30. Prior to the rebuilding operation, the first section of dryers had been completely resurfaced and rebalanced.

The rebuilding of the machine has increased the range of grades that can be manufactured on the machine, making possible surface-sized sheets with improved printing characteristics.

▼

FINANCIAL

▶▶▶ SECURITIES PRICES, including those of paper companies, fluctuated over a narrow margin during the entire month of August, with no significant trend either bearish or bullish.

American Writing Paper Company—Net loss in the first half of 1948 was $32,019.53 compared with a profit of $373,627 a year ago. Advancing costs, including wages, are ascribed as the reason for the drop in earnings.

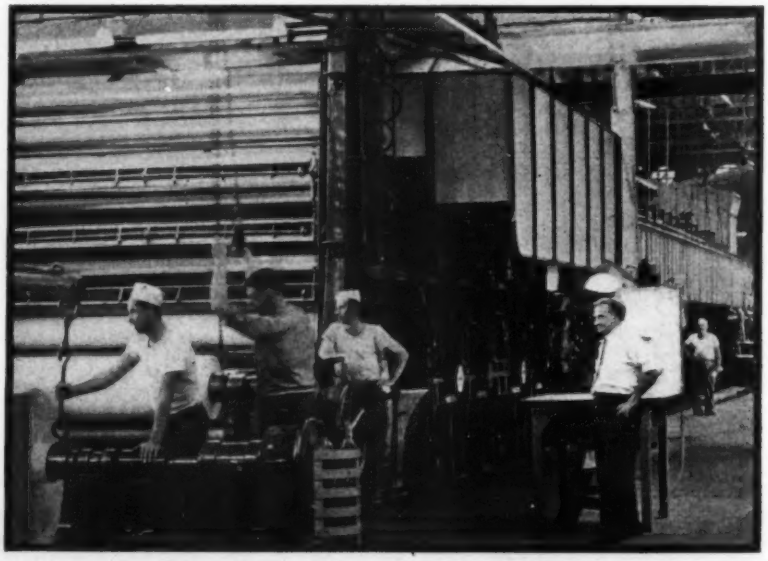
A.P.W. Products Company—Net income for six months ended June 30 was $149,046 as against $98,560 a year ago.

Certain-Teed Products Company—Net income for six months ended June 30 was $3,186,968 as against $2,917,123 in the first half of 1947.

Champion Paper & Fibre Company—Net income for two months ended June 30 was $2,120,815.

Dennison Manufacturing Company—Net profit for the first half of the year was $720,000 as compared with $922,000 a year ago.

Dixie Cup Company—Net earnings for the year ended June 30 were

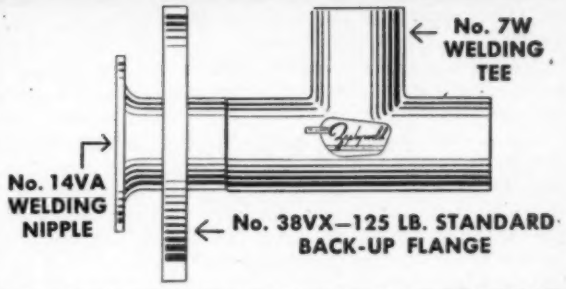


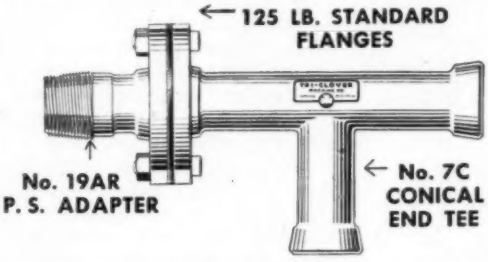
Rebuilt and modernized No. 4 paper machine at Nekoosa (Wis.) mill of Nekoosa-Edward Paper Co.

Tri-Clover STAINLESS STEEL O. D. Tube Size INDUSTRIAL FITTINGS

***Using Zephyrweld WELDING FITTINGS...**
(Stainless Steel Type 304—347—316)

It is a simple matter to adapt Tri-Clover Welding Fittings thru the use of tube size Welding Nipples . . . Slip-on, Socket Joint or Companion Flanges, or by using I. P. S. male or female adapters which assemble to tubing by simple expanding or butt welding. Sizes from 1" thru 24" (*outside* tubing diameter). *For complete details, send for Catalog 748.*



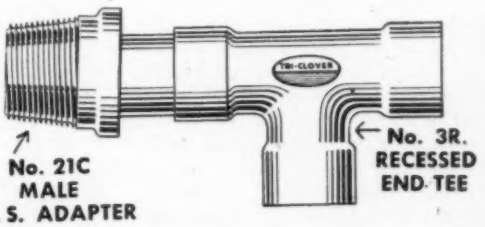


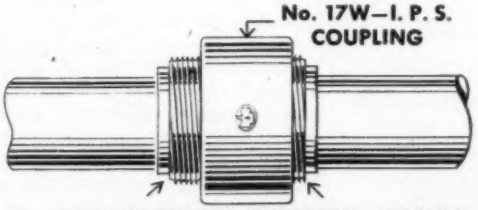
***Using Flanged Type CONICAL END FITTINGS...**
(Stainless Steel Type 316)

Simple male and female I. P. S. adapters provide fast, easy assembly of Tri-Clover Conical End Fittings to threaded iron pipe size fittings and valves. For assembling to flanged fittings and valves, standard-dimension 125 lb. and 150 lb. flanges are available, which are bored to mate with the conical end fittings. Sizes from 1" thru 10" (*outside* tubing diameter). *For complete details, send for Catalog 847.*

***Using Recessed-End FITTINGS...**
(Stainless Steel Type 304—347—316)

Employing standard methods of soft soldering, socket welding, or silver brazing, Tri-Clover Recessed-End Fittings can be quickly adapted to threaded iron pipe size fittings (male or female) through the use of simple adapters, as illustrated. Light gauge tubing end is cut square, inserted into recessed end of adapter, joined by any of the three simple assembly methods. I. D. of fitting matches O. D. of tubing. Sizes, 1" thru 10" (*outside* tubing diameter). *For complete details, send for Catalog 948.*





Using Wallace PIPE UNIONS...
(Stainless Steel Type 304—347—316)

This patented joint permits a rapid adaption of light gauge tubing to standard threaded valves, couplings, flanges and other fitting types. Tri-Clover Wallace Joints (threaded ferrules) are firmly attached to tube ends by expanding, butt welding, or pre-fabrication. Pressure tests prove unions are completely leak tight. Sizes from ¾" thru 4" I. P. S. *For complete details, send for Catalog 647.*

● **TRI-CLOVER O. D. TUBE-SIZE FITTINGS SAVE UP TO 65% IN MATERIAL**...without loss of strength. Due to the basic difference in weight between iron pipe size and light gauge tube size, the savings in "dead metal" will run as high as 65% when Tri-Clover Stainless Steel O. D. Industrial Fittings are used with tubing to form lightweight, low-cost, corrosion-resistant conveying lines. Tube bursting pressures (5,225 psi for 1½" tube) provide safety factors more than ample except for infrequent requirements for extremely high pressure. *See your Tri-Clover Jobber, or write for catalogs.*

SEE OUR EXHIBIT
CHICAGO COLISEUM
NATIONAL CHEMICAL EXPOSITION
DEC. 12, 13, 14, 15, 16 1948

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

$1,534,267 as against $1,286,487 for the previous year.

Eastern Corporation—Net profit for six months ended June 30 was $1,257,344 as against $662,123 a year ago.

Robert Gair Company—Net income for six months ended June 30 was $2,862,910 as compared with $3,216,599 a year ago.

Gaylord Container Corporation—Net income for six months ended June 30 was $4,229,498 as against $4,751,017 a year ago.

Great Northern Paper Company—Net income for six months ended June 30 was $2,165,012 as against $2,280,639 a year ago.

Hammermill Paper Company—Net income for the first half of 1948 was $830,901.

Hinde & Dauch Paper Company—Net income for six months ended June 30 was $1,886,482 as against $1,665,000 a year ago.

International Paper Company—Net profit for three months ended June 30 was $15,243,029 as compared with $14,747,370 for the same quarter a year ago. Net for six months ended June 30 was $28,556,437 as compared with $26,407,910 for the first half of 1947.

Kimberly-Clark Corporation—Net income for six months ended June 30 was $4,087,916 as against $3,744,966 for the first half of 1947.

Marathon Corporation—Net income for nine months ended July 31 was $6,280,366 as compared with $3,599,300 a year ago.

Minnesota & Ontario Paper Company—Net profit for six months ended June 30 was $3,060,375 as compared with $2,635,755 a year ago.

National Container Corporation—Net profit for the six months ended June 30 amounted to $3,584,711.79 compared with $5,997,383.68 for the first half of 1947.

National Vulcanized Fibre Company—Net income for six months ended June 30 was $652,652 as against $789,718 a year ago.

Oxford Paper Company—Net earnings for six months ended June 30 were $808,932 as against $1,395,939 for the same period in 1947.

Puget Sound Pulp & Timber Company—Net income for six months ended June 30 was $3,082,424 as against $2,138,016 for the first half of 1947.

Rayonier, Incorporated—Net income for six months ended June 30 was $5,012,251 as compared with $3,062,106 for the first half of 1947.

Sorg Paper Company—Net earnings for six months ended June 30 were $421,294 as against $743,922 for the same period a year ago.

Sutherland Paper Company—Net earnings for six months ended June 30 were $1,101,698 as compared with $1,205,893 a year ago.

Union Bag & Paper Company—Net income for six months ended June 30 was $7,273,367 as against $5,743,542 a year ago.

United States Envelope Company—Net earnings for six months ended June 30 were $445,773 as against $833,200 a year ago.

S. D. Warren Company—Net earnings for six months ended June 30 were $1,117,834 as compared with $1,235,788 a year ago, though sales increased from $12,000,000 to over $14,000,000.

West Virginia Pulp & Paper Company—Net income for nine months ended July 31 was $8,001,819 as against $7,878,734 for the same period in 1947.

New York Stock Exchange—Stocks

	Closing Prices Aug. 25, 1948	July 26, 1948
A.P.W. Products	5¼	5½
Celotex	29	30⅝
Same Preferred	18¾	19⅝
Certain-teed Products	16¼	18
Champion P & F Co.	24½	*23-23½
Same Preferred	*96½-98	*98½-100
Chesapeake Corp.	*27¼-28½	*28⅞-29½
Container Corp.	36⅝	35⅞
Same Preferred	*92-95½	96
Continental Diamond	11	10⅞
Crown Zellerbach	28⅝	31⅛
Same Preferred	100½	100½
Same $4 Preferred	106⅛	116½
Dixie Vortex	*31-33½	36½
Same "A"	*52½-53¼	52
Robert Gair	8	8¼
Same Preferred	*18½-18¾	18¾
International Paper	59⅛	57¾
Same Preferred	95	98
Kimberly-Clark	21⅞	22
Same Preferred	*96½-98	*103¼-104
McAndrews & Forbes	*36½-37	*36½-38
Marathon	22⅝	*21¾-22¼
Masonite	61	66¼
Mead Corp.	18¼	19⅝
Same Preferred	91	93
Same 2nd Preferred	36¼	*38¾-42
National Container	10⅜	11⅞
Paraffine Cos.	*23½-23¼	25
Same preferred	*103¾-104¼	*103½-105
Scott Paper	46	*46¾-48½
Same Preferred	*92½-93½	93
St. Regis	11⅝	12⅛
Same Preferred	*89-91	90½
Sutherland Paper	*41-42½	*40¾-42
Union Bank & Paper	34⅜	33⅜
United Board & Carton	*11-11¼	11⅜
United Wall Paper	4	4⅜
Same Preferred	24	28½
U.S. Gypsum	107	103
Same Preferred	*170-172¼	174½
West Va. P & P	*45½-46½	47⅞
Same Preferred	*105-106	*107¼-108½

New York Stock Exchange—Bonds

Celotex 3½%	.....	.....
Champ. P & F Co. 3%..	.....	100⅞
Certain-teed 5½%.....	.....	.....

New York Curb Exchange—Stocks

Am. Writing	.....	6⅜
Great Northern	37¼	40
Taggart	.....	10

*Closing Bid and Asked Prices.

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▶▶▶ PURCHASE OF a 12-acre plot of land in Pittsford by Lawless Brothers Paper Mills, Inc., East Rochester, New York, for $19,660 was disclosed through filing of a deed in the county clerk's office. The property is about a mile from the Lawless Brothers plant. Company officials said plans for immediate use of the property were indefinite.

EXPECT OTHER ALASKAN TIMBER AREAS TO OPEN FOR PULP MANUFACTURE

The long-deferred negotiations between the Forest Service and various financial interests for the establishment of pulp and paper mills in Alaska have been concluded with the signing of a fifty-year contract for eight billion feet of timber in the Tongass National Forest by the Ketchikan Pulp & Paper Company (Cf. P.I. and P.W. August, 1948).

Principal financial interests in the Ketchikan company are held by representatives of the American Viscose Corporation, a large user of dissolving pulp, and Puget Sound Pulp & Timber Company. Construction is expected to begin in 1949 of a mill with a capacity of 300 tons of pulp daily. Timber reserves under contract, however, would support a much larger plant. A mill site has been acquired at Ward's Cove, six miles from Ketchikan.

The contract provides a stumpage rate of 85 cents per 100 cu. ft. of timber used for pulp and a higher rate for saw logs and other timber. This rate holds until 1962 at which time a new rate may be determined, and at five years thereafter until 2002. The Ketchikan company is required to have a capacity to 525 tons within 10 years. The investment will involve between twenty and thirty million dollars eventually.

Other interests are said by the Forest Service to be investigating the possibilities of investment in other areas in the Alaskan forestry belt. The immediate studies are of the possibility of building a 300-ton mill near Sitka.

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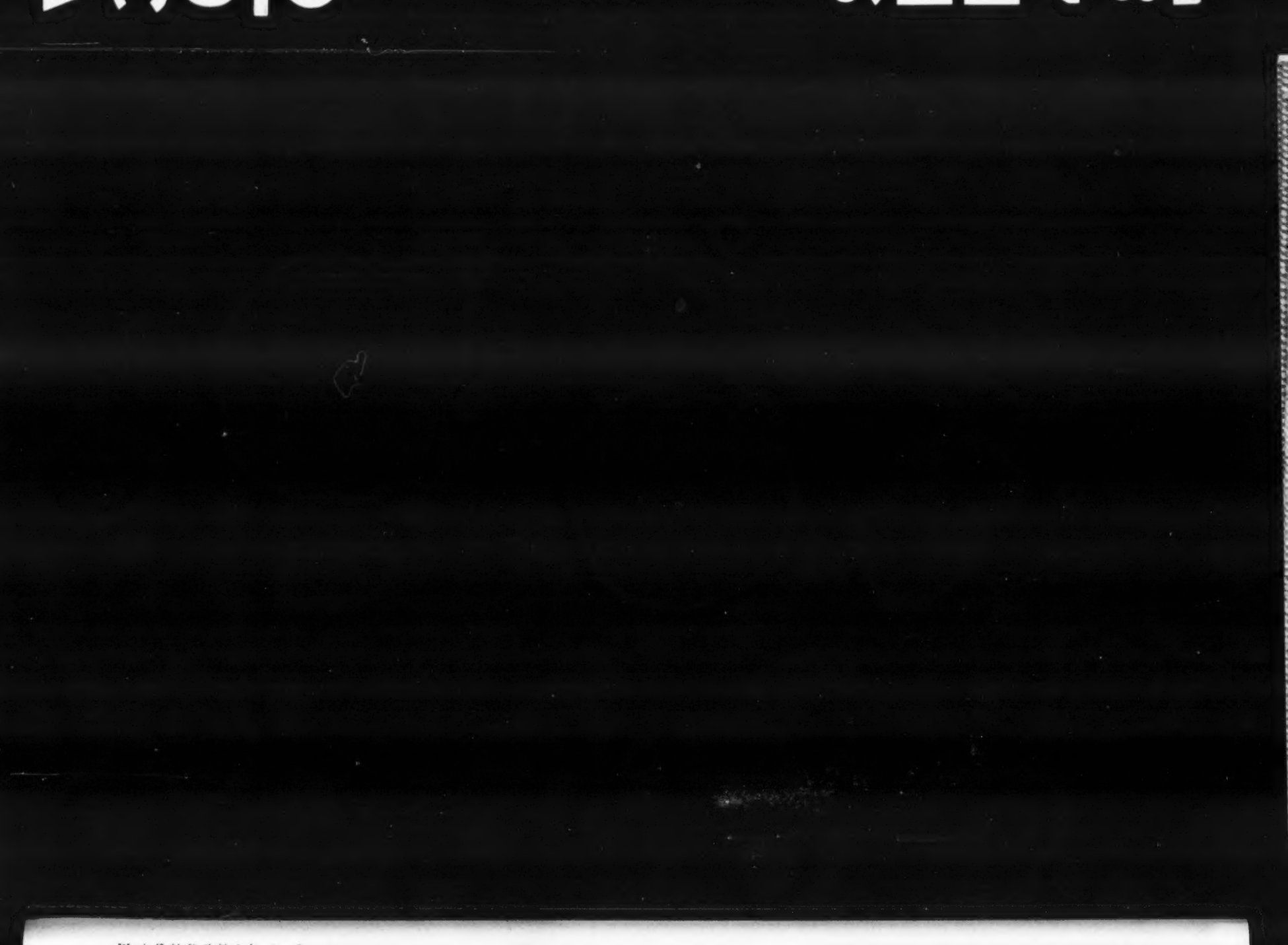
IMPORT NOTES

Several problems involving new classifications of paper to conform to the Geneva trade agreements have been decided, according to Warren B. Bullock, manager of the Import Committee of the American Paper Industry.

Paper bags with specially designed surface has been held to be dutiable as manufactures of paper with a surface design at 5 cents per pound and 10 per cent, not as manufactures of paper at 35 per cent, the rate for plain paper bags.

Wood veneer covered paper claimed to be dutiable at 7½ per cent as uncolored hanging paper classified for duty at 10 per cent as wood veneer.

Toilet paper in rolls claimed to be dutiable at 35 per cent as manufactures of paper, to be dutiable at this rate, but not less than the rate for the basic tissue paper or creped paper, depending on the character of the material. This ruling involves a higher duty



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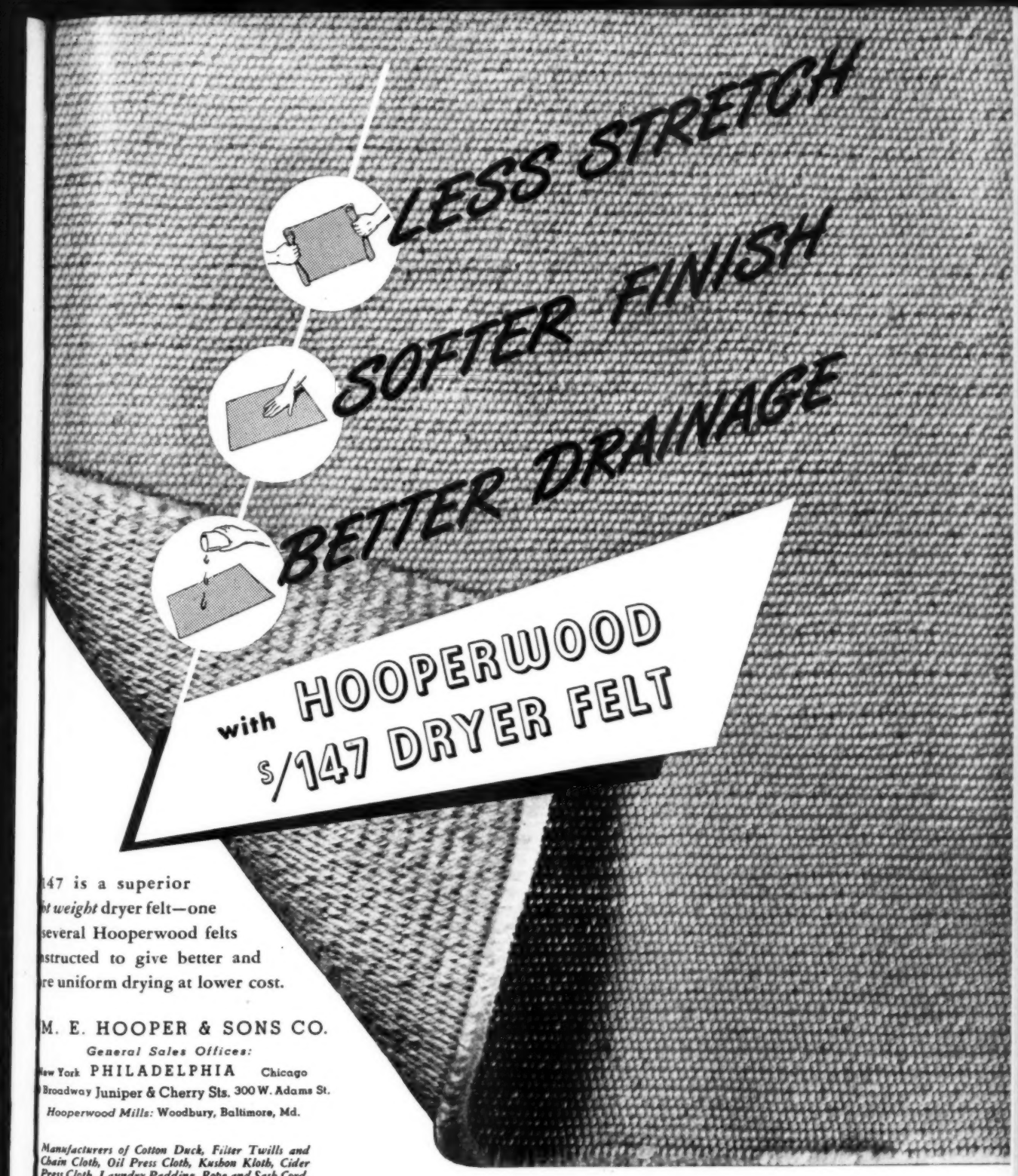

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Manufacturers of Cotton Duck, Filter Twills and Chain Cloth, Oil Press Cloth, Kushon Kloth, Cider Press Cloth, Laundry Padding, Rope and Sash Cord, Heavy Narrow Fabrics, Paper Mill Dryer Felts, and Special Cotton Fabrics.

A PRODUCT OF *Hooperwood Mills*

From only the best cotton

rate than claimed by the importers on the material shipped thus far.

Napkins, doilies, serviettes, etc., have been classified for duty as manufactures of paper at 35 per cent, and not at the rate of 15 per cent provided for paper cut into shape. If the napkins were in tissue paper weights, they would be dutiable at the higher rates for tissue paper.

Charcoal drawing paper of sulphite base claimed to be dutiable as printing paper has been held dutiable at the drawing paper rate.

Charcoal paper, all sulphite in content, has been classified for duty as drawing paper, not at the lower rate for printing paper as claimed by the importer, who tried in vain to secure the support of the Import Committee of the American Paper Industry for his contention.

New cases before Customs officials include the following: Bible paper weighing between 10 and 20½ pounds per ream, imported at San Francisco, claimed to be dutiable at the lower rate for printing paper because it is produced from woodpulp and not rag stock; a southern importer is endeavoring to secure duty free classification for 9-inch rolls of newsprint imported before Congress passed an emergency law making such paper duty free for a limited period; kraft screening paper for interleaving sheet steel believed by the Import Committee to be dutiable as wrapping paper at 25 per cent and not as kraft wrapping paper at 20 per cent.

Thirty-Fifth Conference With Hammermill Agents

A record attendance of 197 paper merchants at the thirty-fifth Conference with Hammermill Agents heard plans for merchandising the increased production of Hammermill papers. Paper distribution executives from all sections of the United States, from Cuba and from the Philippines were present at the Erie (Pa.) meeting August 24, 25, 26 and 27.

The spirit of business co-operation which has been characteristic of the Conferences with Hammermill Agents for many years was an outstanding feature of the 1948 meeting. Referring to this as he welcomed the Agents at the opening business session, Norman W. Wilson, Hammermill president, stated: "Once again I have the honor to be the spokesman for all the men and women of Hammermill. In that capacity I welcome all of you who have so well earned the right to be termed our business associates and our friends."

Following the opening business session on August 25, the visiting paper merchants toured the Hammermill plant. This mill trip was primarily devoted to an inspection of new buildings and equipment in Hammermill's $8,000,000 postwar expansion program, now nearing completion.

Bruce Barton, well-known author and executive in the firm of Batten, Barton, Durstine and Osborn, Hammermill's advertising counselors, was guest speaker at the Fiftieth Anniversary Dinner, held at the Lawrence Hotel, Erie, on the evening of August 25. During this banquet the Agents presented a deluxe desk set to Hammermill in honor of its 50th anniversary. The handsome set contains a plate of gold appropriately inscribed. Dr. Otto F. Behrend, Hammermill cofounder and present treasurer, was presented with a testimonial honoring his fifty years of service to the mill. On behalf of the Agents, Ralph G. Luff, D. L. Ward Company, Philadelphia, and retiring chairman of the Advisory Committee, presented an engraved wrist watch to Harrison R. Baldwin, for many years Hammermill vice president in charge of sales. Mr. Baldwin's retirement becomes effective January 1, 1949.

After the August 25 meetings, the Conference moved to the Kahkwa Club in Erie where business sessions were held on August 26 and 27. Speakers at these meetings included Donald S. Leslie, Hammermill's first vice president and general manager; John D. Zink, vice president and director of merchandising; Grant Richardson, manager of sales; A. Ellis Frampton, manager of advertising and sales development; Mortimer E. Graham, company secretary, and Harrison R. Baldwin. Mr. Leslie spoke in detail about the mill's present position in the fine paper field; Mr. Zink outlined the new merchandising structure for distribution of Hammermill's increased production; Mr. Richardson discussed the quality, production and sales opportunities of Hammermill lines; Mr. Frampton reviewed the mill's current advertising and covered future advertising and sales training plans.

Prior to the general business sessions, members of the Agents' Advisory Committee met with mill officials on August 24 at Weigelia Lodge, Mr. Wilson's country home, for a discussion of the Conference program. Committee members present were: Ralph G. Luff, D. L. Ward Company, Philadelphia, Pa., chairman; H. T. Newell, Sr., Jackson Paper Company, Jackson, Miss.; D. A. Hoadley, Carpenter Paper Company, Omaha, Neb.; L. V. Mulnix, Carpenter Paper Company, Grand Rapids, Mich.; Eric A. Rohrer, Swigart Paper Company, Chicago, Ill.; Frank H. Winter, Carter, Rice & Co., Corp., Boston, Mass.; Hugh G. Boyer, Caskie Paper Co., Inc., Charlotte, N. C.; C. W. Stuyvesant, The Alling & Cory Company, New York, N.Y.; C. S. Lafferty, Beacon Paper Company, St. Louis, Mo.; Allan R. Newmark, Zellerbach Paper Company, San Francisco, Calif.

The assembled Agents elected these men to serve three year terms on the Advisory Committee: Charles H. Williams, Clements Paper Company, Nashville, Tenn.; E. L. Walters, Western Newspaper Union, Omaha, Neb.; C. Raymond Smith, Garrett-Buchanan Company, Reading, Pa. Mr. Eric A. Rohrer, Swigart Paper Company, Chicago, was elected chairman for the next year.

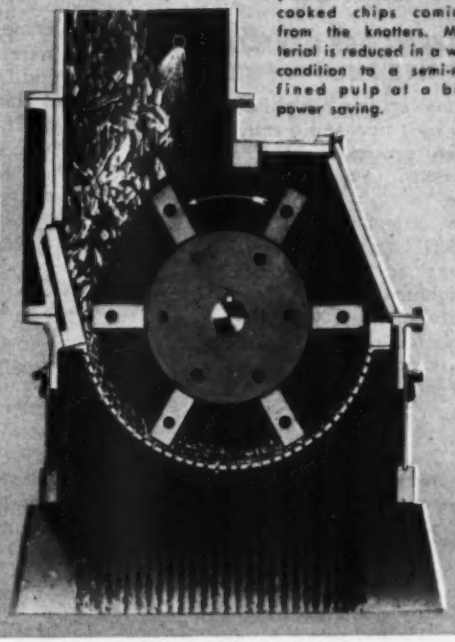
Elected for three year terms on the Paper Committee were: S. B. Gaines, The Capital City Paper Co., Springfield, Ill.; Donald Holmes, The Dudley Paper Co., Lansing, Mich.; John D. Williams, D. L. Ward Company, Philadelphia, Pa.

The final two afternoons of the Conference were devoted to golf and other games. In this competition, Mr. Harold Hurst, Henry Lindenmeyr & Sons, Newark, N. J., won the Ernst R. Behrend Golf Trophy to take possession of

Pulpwood - CHIPS, SCREENINGS

Jeffrey builds a variety of handling, feeding and reduction equipment for the Pulp and Paper Mill. Chain conveyors for handling pulpwood; Belt conveyors for bark, chips and pulplap; Feeders for any number of feeding operations; Bucket elevators for handling salt cake, lime or wood chips; Re-chippers, Grinders, Shredders and Crushers for the reduction of chips, salt cake, bark, etc.

The Jeffrey Screenings Grinder (below) is a swing hammer Shredder equipped to reduce semi-cooked chips coming from the knotters. Material is reduced in a wet condition to a semi-refined pulp at a big power saving.



For many years Jeffrey has been serving the pulp and paper industry . . is fully qualified by experience to provide the utmost in efficient and economical handling and reduction methods. Check with the most modern mills . . you'll likely find some type of Jeffrey equipment on the job . . and remember, that Jeffrey-equipped means efficient operation.

THE JEFFREY MANUFACTURING COMPANY

945-99 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

the silver bowl for the coming year.

Other prize winners of the two days included: Golf: No. 1 Division, low gross, Donald Holmes and Courtney H. Reeves low net, T. J. Thumser and E. J. Petrequin; second low net, Kirby G. Cook and E. E. Cole. No. 2 Division, low gross, J. H. Schneider and Frank P. Leslie; low net, Harold Hurst and Lester L. Nickels; second low net, J. C. Marvin and E. L. Kramer. Kickers' Handicap, R. E. Estes and A. M. Miller. Pitch-'N-Putt, low gross, A. A. Baron and D. Kipp Conover; second low gross, A. Robert Patchen and S. B. Gaines.

Monte Carlo: First prize, Stuart H. Richeson and E. A. Phipps; second prize, Amadeo Ferrer and W. G. Landers. The Selling Game: First prize, G. A. Naumann and F. Earle Windows; second prize, Edward Sylvander and G. Taylor Sykes. Dart Bowl: First prize, Albert Carus and Z. D. Milledge; second prize, Milton D. Bradford and Ernest C. Mead. Bowling Blocks: First prize, Thomas R. White and J. M. H. Fitzgerald; second prize, Ralph G. Luff and W. Predmore.

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EASTERN CORP. DEVELOPS NEW SULPHITE PULP—"PUROCELL"

A fine grade of sulphite pulp, produced by a new and greatly improved chemical process, has been announced by Eastern Corporation, of Bangor, Maine.

This new pulp will be known as "Purocell" (registered). It is purified to bring out the exceptional qualities of brightness, cleanness, strength, and workability that make it especially suitable for high-grade papers. "Purocell" is now being used in Atlantic Bond and Eastern's other fine business papers.

▼

BYRON WESTON COMPANY BUYS RIGHTS TO PRODUCE CAREW CO. PAPER LINES

The rights to make Old Hampshire Bond and other well-known lines of the Carew Manufacturing Company have been purchased by the Byron Weston Company, Dalton, Massachusetts, a recent announcement states. The Carew company was sold in August to Texon, Inc., (See item this section) and the sale of the Carew brand names and watermarks was made before the sale of the company.

Falcon Ledger, Merit Bond, Lenox Ledger, and Lenox Bond are among the lines taken over by the Byron Weston Company. The latter company will have the privilege of selling Old Hampshire Bond in flat sheets to the printing trade, but the Hampshire Paper Company, of which Constant Southworth is head, will continue to convert this line for the stationery trade. Old Hampshire Bond was first made by the Hampshire Paper Company, and its manufacture was transferred to the Carew mill a few years ago.

A 100 per cent extra fine rag bond, this famous line is said to be the first paper brand to be nationally advertised. A campaign to promote it was launched in 1901 by the late Charles H. Southworth and the late James Taylor.

▼

PRES. FERGUSON AND FIVE ST. REGIS OFFICIALS TOUR COMPANY'S NO. N.Y. PLANTS

When Roy K. Ferguson, president of St. Regis Paper Company, made an inspection of all St. Regis plants in northern New York recently, he declared that there is a balance between demand and production for all grades of paper manufactured by the company under its new production program resulting from plant expansion in 1947-1948.

Accompanying Mr. Ferguson on this tour were five company officials: E. R. Gay and Lyman A. Beeman, vice presidents; Horace R. Lamb, general counsel; W. H. Versfelt, vice president and treasurer, all of New York City; and William R. Adams, head of the company's Kraft Department.

The inspection tour was designed to view the recent improvements of the northern New York plants under the expansion program. "The new production which has come in late 1947 and 1948 is serving to bring the demand for all grades of paper into balance with production," said Mr. Ferguson. "However, certain kraft grades are still in short supply, as in newsprint."

Mr. Ferguson said that the improvement program of St. Regis is coming to a conclusion and probably will have been completed late this year or early in 1949.

▼

25 EMPLOYEES RECEIVE STRATHMORE AWARDS

Commemorating a quarter-century with the company, service pins were given to 25 members of the Strathmore Paper Company, West Springfield and Woronoco, Massachusetts, at special exercises following a banquet held in their honor recently at the Strathmore Community Building in Woronoco. Mr. George E. Williamson, president of Strathmore, presented the pins.

These awards bring the total Strathmoreans having 25 years of service or more to 188, including 28 who have now retired from active service with the company. The active employees in this latest group raises the total number with 25 years of service or more to slightly more than a quarter of all the company's employees.

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GEORGIA YOUTHS RECEIVE FORESTRY INSTRUCTION AT BOYS TRAINING CAMP

More than 80 Georgia youths received practical forestry training August 16-21 at a Boys Training Camp held at Hard Labor Creek State Park near Rutledge (Ga.).

The camp was sponsored by the Georgia Forestry Department in cooperation with Brunswick Pulp and Paper Company, of Brunswick; Macon Kraft Company, of Macon; and Southern Paperboard Corporation and Union Bag and Paper Corporation, both of Savannah.

The week of activities was provided boys without cost except for transportation. The training periods covered the growing, harvesting, and marketing of forest products. Practical field work and demonstrations were held on wooded tracts of the 5,000-acre park.

Instructors supervising the training represented the State Forestry Department, the Georgia Extension Service, and the sponsoring firms. A cash prize of $25 was given by the "Keep Georgia Green" committee to the youth making the best record at the forestry camp.

▼

MANDO FELLOWSHIP AWARD FOR COMING YEAR ANNOUNCED

The Mando Graduate Research Fellowship in the Forestry college at the University of Minnesota, offered by the Minnesota and Ontario Paper Company, has been awarded for the coming year to Ralph Anderson of Squaw Lake, Minnesota.

Established in 1946, this Mando scholarship, carrying a $900 grant, goes for the second successive year to Mr. Anderson to undertake co-operative research investigation of a particular forest project. The primary purpose of the particular research project being conducted under this Mando Fellowship, according to Dr. Frank Kaufert, Chief of Division of Forestry at the University, is to establish a series of study plots to determine the best methods of cutting black spruce stands affected by mistletoe blight in order to eliminate or control the damage.

Mistletoe damage has been one of great concern to the forest industries for some time, owing to its ruinous effects on some of the best spruce lands

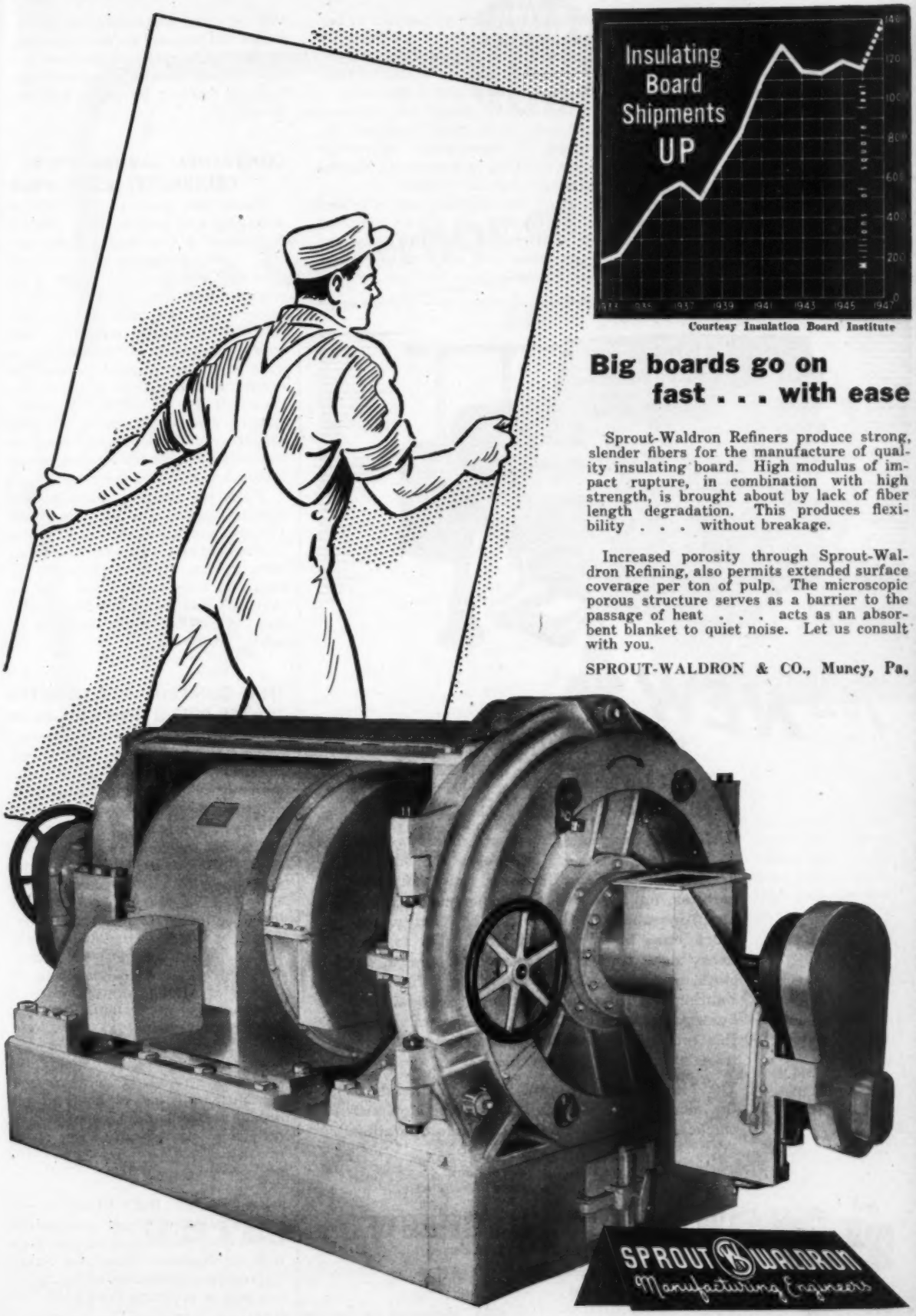
Courtesy Insulation Board Institute

Big boards go on fast . . . with ease

Sprout-Waldron Refiners produce strong, slender fibers for the manufacture of quality insulating board. High modulus of impact rupture, in combination with high strength, is brought about by lack of fiber length degradation. This produces flexibility . . . without breakage.

Increased porosity through Sprout-Waldron Refining, also permits extended surface coverage per ton of pulp. The microscopic porous structure serves as a barrier to the passage of heat . . . acts as an absorbent blanket to quiet noise. Let us consult with you.

SPROUT-WALDRON & CO., Muncy, Pa.



throughout the country. Investigations on this matter as carried out under the Mando Fellowship are among the first studies to be conducted to eliminate or control the damage to black spruce in an attempt to preserve and protect this particular specie.

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CROSSETT PAPER MILLS ANNOUNCE EXPANSION PLAN

Crossett Paper Mills (Crossett, Ark.) has announced the inauguration of an expansion program that is being carried out in accordance with its policy of keeping productive facilities in balance with the supply of raw materials. An analysis of pulpwood available resulted in the addition of another fourdrinier paper machine at the mills.

The new fourdrinier unit will be a 210-inch, high speed machine, designed to manufacture lightweight kraft paper of various grades, varying in weight from 20 to 40 lb.

Three new digesters are in process of construction and will be completed in November. Design has begun and construction will start in the fall to extend the present machine room so that the new fourdrinier can be installed and prepared for operation early in 1950. Also under construction is a new research laboratory and a modern facilities building for paper mill personnel.

▼

CONTAINER LABORATORIES CELEBRATES 25TH YEAR

Twenty-five years in the field of packaging and packing were recently completed by Container Laboratories, Inc., Chicago. During this time the firm has broadened the scope of its services until they include package research activities, plant surveys, consultation on specific packaging problems, and freight car inspections, in addition to the original program of testing and designing shipping containers. It also has originated and developed methods of testing shipping containers and has designed many of the special purpose testing devices now accepted as standard machines.

Today the company maintains and operates laboratories in New York, Chicago, and San Francisco, where facilities have been expanded to embrace tests on many types of packages. The staff now consists of almost fifty individuals, each with a rich background, and three of the original founders are active today.

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NEW CONTROL ACT TO SPEED WATER POLLUTION RESEARCH

Under the provisions of the recently-enacted Water Pollution Control Act, research in finding methods of reducing pollution of our water resources by industrial wastes and domestic sewage will be greatly agumented.

The Act provides for authorizations of $800,000 a year for each of the next five fiscal years to erect, furnish and equip such buildings and facilities at Cincinnati, Ohio, as may be necessary for the use of the Public Health Service in connection with the research and study of water pollution and the training of personnel in work related to the control of water pollution. Since its establishment in 1913, the Cincinnati laboratory has been the national headquarters for water pollution research. The results of the research at Cincinnati will be employed in furnishing the technical answers required for the proper administration of the new law.

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▶▶▶ PAPER INDUSTRY interest in pilot plant operations in connection with stream pollution is running high, with the National Council for Stream Improvement personnel taking an active part in operating the plants.

It's NEW

SMITH & WINCHESTER
MODEL "E"
UNDERCUT TRIMMER

A NEWLY designed Undercut Trimmer retaining the outstanding features of the Smith & Winchester Standard Undercut with many new features, for fast, safe, accurate, more convenient operation. Features include: Heavy one-piece base frame; hinged front table to take away stock from cutter after cut; knife, to cut stock, raises from below the table; anti-friction bearings on drive shaft; disc type friction clutch; back gauge operated by variable speed, reversible motor for close setting; push button controls; illuminated index tape.

The Model "E" Undercut meets the needs of the modern finishing department for high production, accurate trimming and safe operation.

Makers of PAPER BAG and PAPER MILL MACHINERY

Investigate the new Model "E" for your peacetime needs. Bulletin giving full particulars mailed on request.

THE SMITH & WINCHESTER
Manufacturing Company
SO. WINDHAM, CONN.

Serving the Paper Industry Since 1828

UNION PACIFIC

The Governor of Nebraska invites You

VAL PETERSON
GOVERNOR

STATE of NEBRASKA
EXECUTIVE OFFICE
LINCOLN

To American Industry:

In the last decade, Nebraska's productive capacity has grown threefold. Modern industry has found in increasing numbers that Nebraska's diversified assets form the economic cornerstone of a better tomorrow!

Here there is respect and reward for individual initiative, whether its hallmark be overalls or a business suit. Nebraskans prize ingenuity, cooperation and achievement. Their fundamental faith is reflected by Nebraska government in a conscientious resolve against debt, restrictive taxes and regulatory legislation.

In behalf of all citizens, I invite industry to share Nebraska's unique heritage as the continental crossroads of commerce and heart of a land unmatched in natural wealth.

Sincerely,

Governor

Val Peterson

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

What is it?

NEW IMPCO "IMPELLER" TYPE AGITATOR FOR CONTINUOUS LOW DENSITY BLEACHERS

(PATENT APPLIED FOR)

Sets a new high mark for uniform retention time during bleaching

NEARLY 600 Impco Agitators and "What-is-its" of various types are now in bleaching or other paper mill services. Of these there is probably one that will come close to your requirements. If not we will gladly design one for you.

Typical consistencies handled by our equipment:

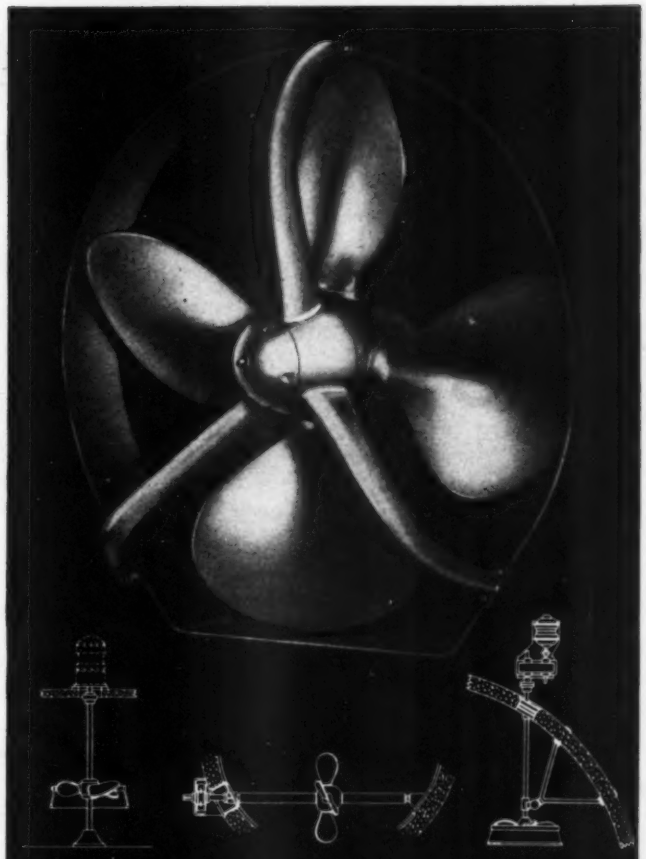
1. As low as 0.2%—mixing tanks and chambers
2. 3% to 5%—typical storage chests, whether horizontal or vertical, round or rectangular—with optional special attention on blending to give pulp uniformity
3. 4% to 8%—typical low density bleaching range, where uniform retention without "blending" is required
4. 10% to 16%—typical "medium" consistencies for batch or continuous bleaching; or high density storage
5. 20% and up—typical for special bleaching applications, continuous caustic steeping, special high density storage, and for broke repulping chests

If you have any problems in pulp agitation, let us outline our suggestions. A-15

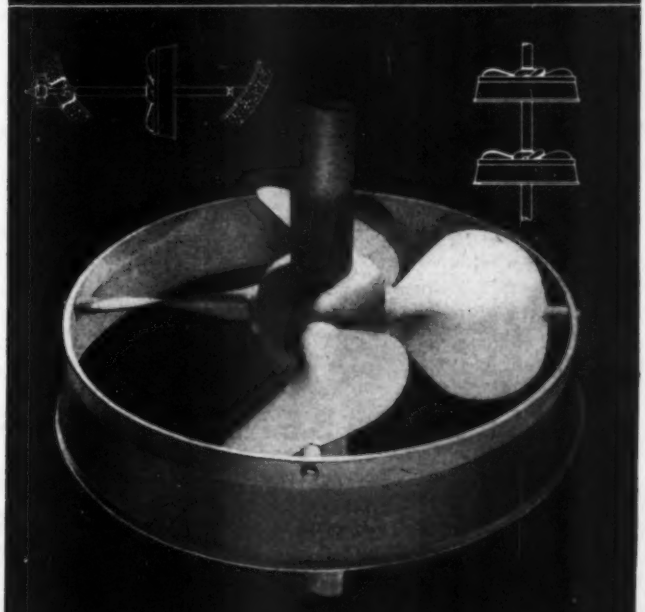
Improved Paper Machinery Corporation
NASHUA, NEW HAMPSHIRE

Impco

PULP MAKING MACHINERY



Adjustable Pitch Propellers
for horizontal mid-feather type chests



Shrouded Type Propellers
for use where a directed flow is required

Put your Costs through the wringer—

It costs over ten times as much to evaporate a pound of water as it costs to press it out. Every drop you can squeeze from your sheets of paper or board at the press rolls represents steam and time saved at the driers. Every minute saved at the driers represents additional tonnage at the winders.

Superintendents who know their costs also know that Hamilton Felts play an important part in reducing costs.

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will put your costs through the wringer.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

If you're interested in valves that will give you any or all of these operating advantages then you'll be interested in

NON-CONTAMINATING

MINIMUM MAINTENANCE

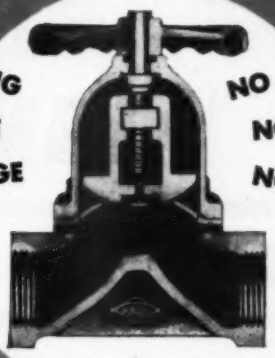
NO VALVE STEM LEAKAGE

NO CORROSION

NO CLOGGING

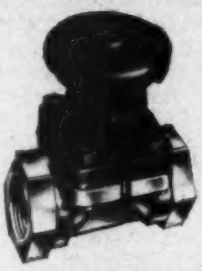
NO SEEPAGE

GRINNELL - SAUNDERS DIAPHRAGM VALVES



Valve Open

Valve Closed



FOR CHEMICALS

Stainless Steel valves with special diaphragms are handling satisfactorily such corrosive chemicals as phosphoric, acetic and chromic acids.

FOR BEVERAGES

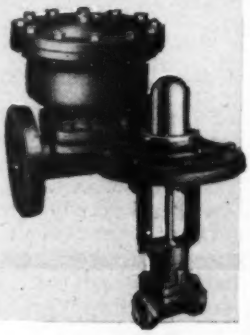
Bronze valves with socket ends (left) and with hose threaded end (right), both with special white rubber diaphragms, are stopping leaks and cutting maintenance to the bone in breweries handling millions of barrels of beer.

FOR PULP and PAPER

Rubber lined valves are setting new performance records handling pulp, alum and sulphuric acids in paper mills.

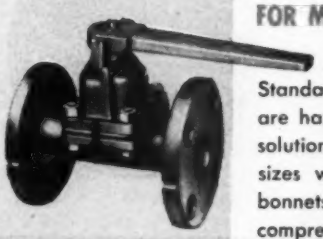
FOR TEXTILE PLANTS

Aluminum body valves with rising stems have won enthusiastic approval in bleacheries handling hydrogen peroxide and other chemicals.



FOR FOODS

Piston-operated valves (left) and air motor operated valves (right), both glass lined and with proper diaphragms, are providing remote control in plants handling sodium chloride, sodium hydroxide, sulphuric acid and fruit juices.



FOR MINES

Standard rubber-lined valves are handling highly abrasive solutions and slurries. Small sizes with quick-operating bonnets are widely used on compressed air lines to prevent leakage.

Grinnell-Saunders Diaphragm Valves may eliminate valve troubles and cut valve maintenance on your pipe lines. Available in any combination of valve bodies and linings, diaphragms and operating mechanisms. State your requirements or ask for Catalog 2-S on "Grinnell-Saunders Diaphragm Valves". Grinnell Company, Inc., Providence 1, R. I. Branch warehouses in principal cities.

GRINNELL

WHENEVER PIPING IS INVOLVED

VANDERBILT

PRODUCTS FOR THE PAPER INDUSTRY

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

Paper Consumption Still Increasing

▸▸▸ CONFIRMING the opinion of the National City Bank's August letter saying that "pessimism has been overdone" in forecasting the increased volume of United States business during the past three years, comes now the Federal Reserve Bank's Index of Industrial Production, showing that the Index Number dropped from 192 in June this year to 187 for July. Comparing these months with a year ago, the Index Number dropped from 184 in June to 176 in July. This means that general industrial activity enters the beginning of this fall at 11 points higher than a year ago. The outlook is that the activity will exceed the November and December figures of 192 last year by a substantial margin.

So, as this column has been predicting, the 1948 general volume of business will be greater than the all-time high record volume made in 1947. This means another record volume year for the paper industry also.

During the first six months of this year, many cautious merchants and consumers were predicting that the supply of paper was at last balancing the demand. Some grades of paper, particularly in the cultural division, did show an easement of demand. But, in the industrial division, where 70 per cent of the consumption of paper products go, there was no easement at all, but rather an accentuated demand was apparent.

Anticipating now, since mid-August, that the recent and present demand for industrial paper is on the increase, consumers are actively trying to cover their requirements for this fall and winter business. And, well they may for the production of paper is crowding the capacities to the straining point.

In 1947, the capacity of the industrial paper was 21,775,000 tons and the production was 21,029,000 tons—at the ratio of 97 per cent. The capacity increase was 6.6 per cent and the production increase was 8.8 per cent over the corresponding year of 1946.

For the first six months of 1948, the increase in production was at a yearly rate of 6 per cent, indicating a total production for the year, if the first six months production rate is maintained, of 22,290,000 tons. This would show a total probable increase for the year of 1,261,000 tons over 1947, against an actual increase in 1947 of 1,751,000 tons.

. The trend is a slow-up from now on of capacity increase and for a material increase in demand for all paper production tonnages. In other words, capacity to produce is reaching a physical limit, but demand for paper products is enlarging.

Therefore, in our opinion, and in accordance with the developed facts of general business volume in this country for all industrial commodities, the consumers of paper products are warranted in anticipating their supplies of paper for future consumption.

You Can Prevent Them!

▸▸▸ A FLAMING CARICATURE of The Fifth Horseman rides on posters now being distributed for use during the week of October 3, proclaimed by President Truman to be observed nationally as Fire Prevention Week.

Fire losses are on the increase. Not a happy thought, but statistics released by the U. S. Forest Service reveal that forest fires in 1947 were the worst since 1943 when more than 32 million acres were burned over.

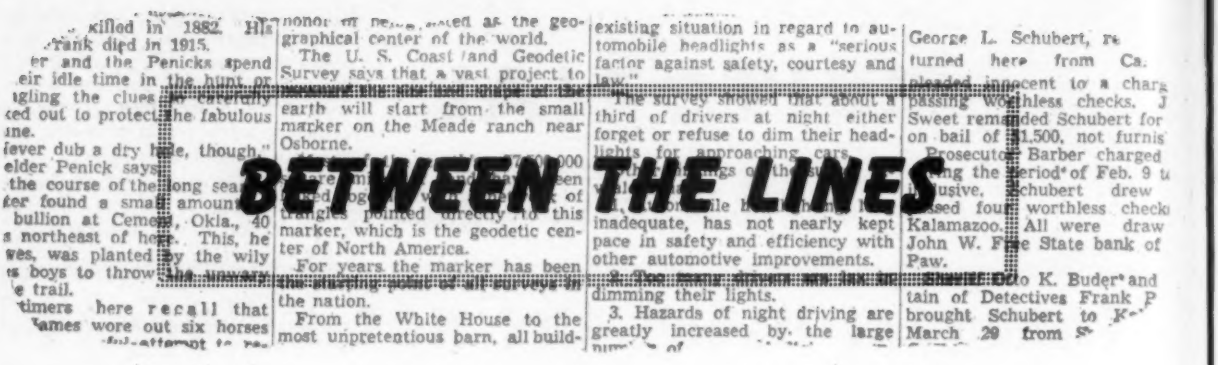
During the past year, 200,799 fires burned over 23,225,932 acres of forest land in the United States as compared with 172,278 fires and 20,691,393 acres in 1946. Timber stands, improvements and property damage amounted to $55,000,000, a marked increase over the $32,000,000 damage for the previous year.

In a summary of forest fire statistics, released by the *Forestry Digest* (published by American Forest Products Industries, Inc.) the statement is made "that the major portion of our losses could be prevented if all our forest lands were under organized protection." Of the 327,968,000 acres of state and private lands under protection, only .86 per cent were burned last year. Of the unprotected state and private lands, 18.1 per cent or nearly one acre out of every five was burned.

Until the close of the fire season around October 30, your mail may carry a slogan affixed through the use of fire prevention dies in the postoffices of 38 major cities. The slogan "Remember—Only You Can Prevent Forest Fires," will be imprinted on approximately 30 million pieces of mail a day. This part of the forest fire prevention campaign has been authorized by the Postmaster General in co-operation with the Forest Service of the U.S. Department of Agriculture. Lyle F. Watts, Chief of the Forest Service believes that the slogan on the mail time after time certainly should remind millions of people that they all lose when carelessness results in forest fire. Hazards have been increased nowadays with more people in the woods than ever before.

The slogan also will be displayed on posters displayed in street cars, buses, newspaper advertisements, billboards, and other media throughout the country in the Federal-State Co-operative Forest Fire Prevention Campaign sponsored by the Advertising Council.

A slogan may travel far in a week, but "Make Every Week Fire Prevention Week."


killed in 1882. His
rank died in 1915.
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the course of the long sea
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bullion at Cement, Okla., 40
s northeast of here. This, he
ves, was planted by the wily
s boys to throw the unwary
e trail.
timers here recall that
ames wore out six horses
honor of being designated as the geographical center of the world.
The U. S. Coast and Geodetic Survey says that a vast project to
earth will start from the small marker on the Meade ranch near Osborne.
triangles pointed directly to this marker, which is the geodetic center of North America.
For years the marker has been
the nation.
From the White House to the most unpretentious barn, all build-
existing situation in regard to automobile headlights as a "serious factor against safety, courtesy and law."
The survey showed that about a third of drivers at night either forget or refuse to dim their headlights for approaching cars.
inadequate, has not nearly kept pace in safety and efficiency with other automotive improvements.
3. Hazards of night driving are greatly increased by the large
George L. Schubert, re
turned here from Ca
pleaded innocent to a charg
passing worthless checks. J
Sweet remanded Schubert for
on bail of $1,500, not furnis
Prosecuto Barber charged
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lusive,
Schubert drew
four worthless check
Kalamazoo. All were draw
John W. Fi e State bank of
Paw.
Otto K. Buder and
tain of Detectives Frank P
brought Schubert to K
March 29 from
BETWEEN THE LINES

Kernels and Color

▶▶▶ THE SHORT SUMMERS in the great midwestern grain belt are something like watching the Derby—you bet on your horse and before there is time for you to suffer much suspense, the race is over and either you collect your money at the window or add up your bets on the scratch sheet and guiltily try to estimate how many days you will have to eat lunch at the corner drug store to save back the money the other fellow collected.

By the time the youngsters are pining with disappointment—why school always begins before summer is over—the crop barometer begins to move up, or down, and newspapers fill columns with statistics of bumper harvests compared with doleful figures of certain lean years.

The refrain of the harvest anthem this year is that only corn borers can now prevent the biggest corn crop on record. And the hurrahs barely fade to an echo before there is a faint wailing undertone that sounds like "where will we put the surplus?"

The August issue of *Corn* (published by Corn Industries Research Foundation), has an interesting angle on how corn can be improved. It seems that corn is not just corn; that one scientist in a midwestern State Experiment station has been analyzing corn kernels and has found that the component parts are not immutable. He says the chemical analysis of corn has held fairly constant, with pretty much the same percentage of protein and oil. Furthermore, we are told that it isn't a simple matter to build up the percentage of protein, besides more protein is not a desirable end in itself anyway. But it *is* desirable to develop *better* protein. Protein is not considered of good quality for human or animal nutrition unless it contains all the essential amino-acids. Not many vegetable proteins have the full complement of essential aminos. All of which leads up to the real goal of these researchers—if the cereal manufacturers don't find a short cut to this technological revelation.

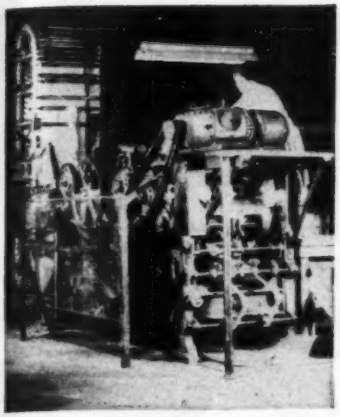
▶▶▶ A CONSOLATION to color-blind persons would result if travel scenery and lush spots of natural beauty could be shown in sound film with an orator that could paint a color word picture of these scenes. Judging from the number of automobile drivers that go through red lights every day there should be enough of such people to fill an ordinary movie house.

It is quite true that the drama of technicolor in everything we see more than inspires—it really conspires along with the paint and dye researchers and manufacturers who do an admirable job of competing with Nature to keep her leaves very green, the sky as blue as always; the tints of the setting sun blended just right, and the vivid hues of every flower garden perfectly harmonized.

Most certainly the eye-getting attention of color in advertising has brought the value of color into the realm of statistics—and space rates. But take it away and fade out all the colored neon signs and colored lights and the public might go into a panic and decide it is affected by a plague of color-blindness. Eye appeal is so important that an eastern State Experiment Station has conducted try-outs with a spectrophotometer to measure the reflected light given off by the puree of certain frozen foods with a view to preventing loss of color in frozen storage. Seems a bit off the beam, but from what we have learned of research, some startling discovery may be traced to this very beginning.

Human beings crave all the trimmings which accounts for our love of color. The appeal of color has become so important that psychologists are now trying out a plan to avoid confusion outside classrooms at schools. The idea is to paint the door the same color as the room; it is thought the pupils will find the right room without having to remember the number (from *Dyelines and Bylines,* Calco Chemical Div.). If the power of suggestion could be stored in the subconscious and the pupils could always give the right answers to questions, teacher would have a roomful of prize pupils.

—By Bessemer



Above: Coty Bottomer, with horizontal type motorized P.I.V. variable speed changer.

Right: St. Regis Tuber, with V-5 vertical type P.I.V. Gear variable speed changer, with extension shaft on hand wheel.

LINK-BELT P.I.V. GEAR SPEED CHANGERS

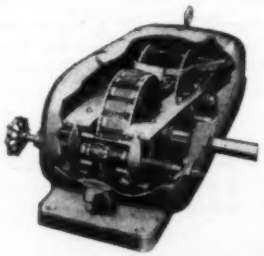
STEP-UP PRODUCTION EFFICIENCY

QUICKER, SIMPLER METHOD OF CHANGING PAPER BAG SIZES—ALSO REDUCES INVESTMENT

Substantial reductions in overhead and time have been effected through the installation of P.I.V. Gear Speed Changers on paper bag making machines at the Wellsburg, W. Va. plant of the Hammond Bag & Paper Company. The length of bag being produced is controlled by the speed of the machine and each ¼" change in bag length was made by changing a pair of fixed-ratio gears.

To permit more rapid change of speed, and to eliminate the investment and upkeep of a large assortment of gears, P.I.V. Gear Speed Changers were installed. Speed changes are made in an instant, without stopping the machine. Furthermore, the "infinitely variable" feature of the P.I.V. gear permits the bag sizes to be varied infinitely instead of by ¼" steps.

With a simple twist of a hand wheel, the ratio between driving and driven shaft speeds is changed by the minutest fraction of a revolution. Once adjusted, this ratio is maintained indefinitely.



The P.I.V. Gear Speed Changer is a unique, all metal, all enclosed device, running in oil, and giving a positive drive with infinitely variable speed ratio between input and output shafts. Speed changes are made instantly and maintained indefinitely. Send for Book 1874-B giving full details and application suggestions.

LINK-BELT COMPANY

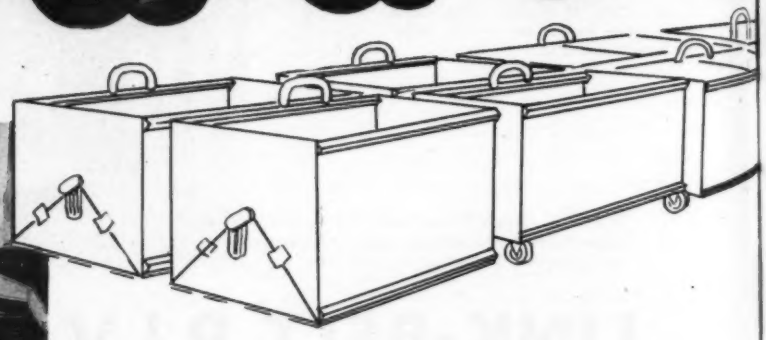
11,048

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

Power Transmission Machinery

THESE FOUR TRUCKS HANDLE 88 CONTAINERS OF 15 DIFFERENT TYPES



Like many industrial operations, this refinery extends over many acres and handles great quantities of materials, in addition to hundreds of cubic yards of scrap and rubbish daily. Choosing strategic points for receiving material, the 88 containers were placed throughout the refinery, the requirements at each point determining the size and number of containers to be used. At some points for liquid, water-tight containers with lids were required. At others, light, bulky waste called for a big capacity, light-weight enclosed container. Some accumulation points were inside buildings. Containers on casters that could easily be rolled indoors were provided. Each container is assigned to one of the four truck hoisting units and, on a synchronized schedule, is picked up as soon as it is filled. Photos at left show: top-truck hoisting unit backing up to a 6 cu. yd. Universal container. The driver attaches two chains, and then, from controls in the cab, the container is hydraulically lifted into carrying position (see photo at left center). Arriving at the disposal area, the container is automatically dumped (see photo left below). The container is then returned to its original point for reloading and the truck hoisting unit moves on to the next container on its route. Pick-up and dumping operations require only a matter of seconds, thus it is possible for one man and one truck to handle any number of containers, keeping a steady flow of material moving without waiting or wasting time.

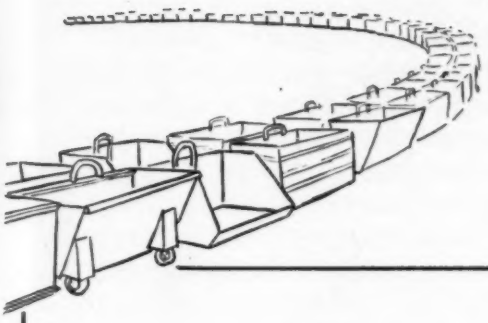
On opposite page are illustrated the types of containers in the original installation and the materials they handle. Note how easily the basic Dempster-Dumpster containers are converted for special purposes by the simple addition of lids, casters or some other special change.

The Dempster-Dumpster system is saving money in large and small plants alike. Its great flexibility makes it adaptable to any plant, regardless of size, and assures tremendous savings along with amazing improvements in efficiency. A survey of your plant, without charge or obligation, could reveal the amazing effectiveness of the Dempster-Dumpster System.

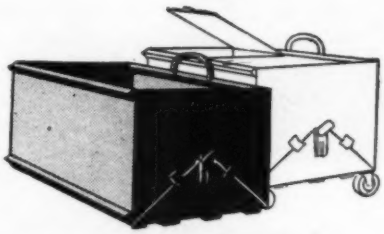
DEMPSTER BROTHERS, Inc.

. . . THIS IS THE DEMPSTER-DUMPSTER SYSTEM . . . SAVES THIS REFINERY $58,000 ANNUALLY

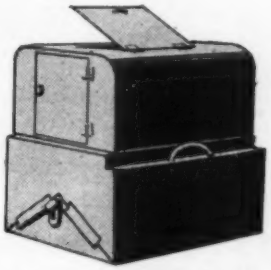
The Dempster-Dumpster System of Materials Handling, simply stated, permits the use of any required number of detachable containers, of various designs and capacities, to be serviced by a single truck. Its ability to effect tremendous savings in handling numerous types of materials has been definitely established in hundreds of leading industrial plants.



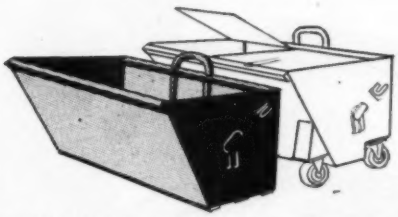
In this particular case, in a large refinery, four of the twelve trucks formerly detailed for materials handling, including scrap and rubbish collection, were equipped with Dempster-Dumpster Hoisting units to handle 88 detachable containers of 15 different types. The Dempster-Dumpster System of quick pick-up and dumping of pre-loaded containers has worked wonders in efficiency, plant appearance, and savings. In one year savings of over $58,000 was shown by our engineers survey. Time has proved the correctness of this survey. Since the original order of 88 containers, so many more uses for the equipment and greater savings were discovered that 55 additional containers have been placed in service with a grand total of 143 containers now being handled by the four trucks.



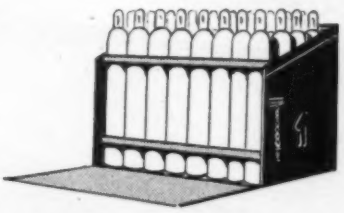
DROP BOTTOM CONTAINERS. 48 drop-bottom containers were furnished for handling trash and rubbish, steel turnings, scrap metal, tube ends and clay:—Twenty 6 cu. yd. open top type, one 6 cu. yd. with lids, nine 2½ cu. yd. open top type, two 2½ cu. yd. open top with casters, six 3 cu. yd. open top, nine 4 cu. yd. with lids, one 4 cu. yd. enclosed with hinged door in top.



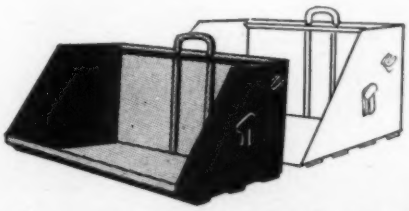
UNIVERSAL CONTAINERS. 13 universal containers were furnished for handling trash and rubbish. Universal containers feature completely enclosed construction, drop-bottom dumping, a door in either end for ground-level loading and a lid in the top for loading from a platform.



TILT TYPE CONTAINERS. 16 tilt type containers were furnished for handling general refuse, sludge and settlings:—Four 3 cu. yd. open top type, nine 3 cu. yd. with lids, three 3 cu. yd. with lids and casters.



SPECIAL CONTAINERS. 3 special containers were furnished for handling and transporting oxygen cylinders from one point to another in the refinery. This container is typical of the many highly specialized uses for which Dempster-Dumpster containers are constructed. Many other containers are available for handling almost any type of material known, be they liquid, dust, light or bulky or very heavy materials.



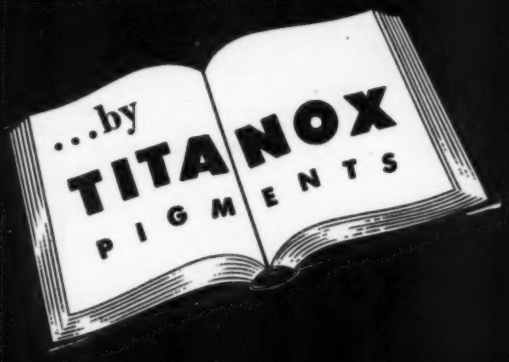
SKIP TYPE CONTAINERS. 7 skip type containers were furnished for handling refuse wax, oil, lube and coal:—Three 3 cu. yd. skip type with lid, three 3 cu. yd. skip type without lid, one 3 cu. yd. skip type with teeth.

DEMPSTER DUMPSTER
TRADE MARK REG.
SYSTEM

798 Dempster Bldg., Knoxville 17, Tennessee

TITANOX . . . *the brightest name in titanium pigments*

the qualities of heavy sheet opacity imparted to lightweight stocks



When your lightweight paper is processed with TITANOX pigments you're sure of giving it an opacity comparable with that of heavyweight stocks. Thus "show-through" is materially reduced.

What's more, printers and users of printed material prefer paper treated with these titanium dioxide pigments because such paper also has a whiteness and brightness that's unsurpassed in attractiveness, printability and sales appeal.

The TITANOX line is still in greater demand than its supply, although production is being increased steadily. In case you are unable to get all the pigment you need, our Technical Service Laboratory will help you make the most of what you do have. Get in touch with our nearest office.

TITANOX

Reg. U. S. Pat. Off.

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

111 Broadway, New York 6, N. Y.
104 So. Michigan Ave., Chicago 3, Ill.
350 Townsend St., San Francisco 7, Cal.
2600 S. Eastern Ave., Los Angeles 22, Cal.

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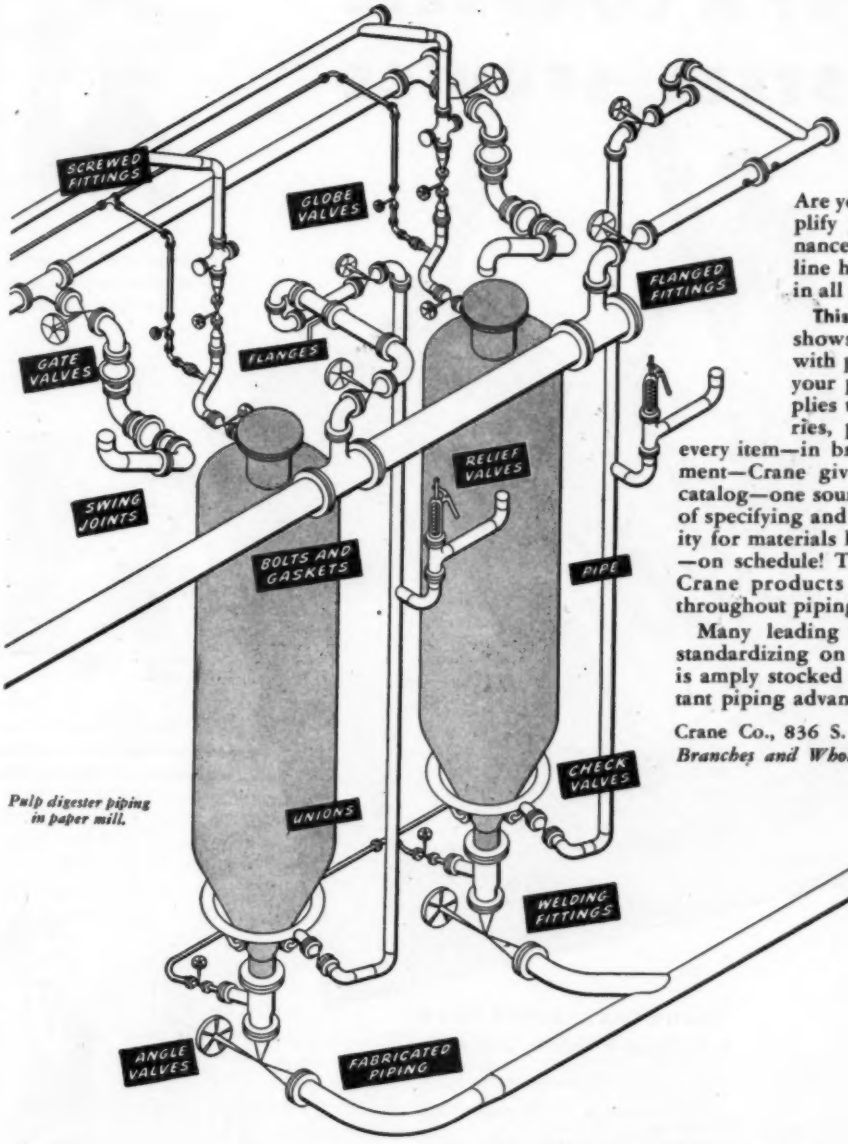

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THE PAPER INDUSTRY
and PAPER WORLD
SEPTEMBER 1948

Weyerhaeuser Has Modernized Its Longview Pulp Division

▶▶▶ OVER THE YEARS, the State of Washington, the Federal Government, and the public in general have become more and more concerned with the pollution of streams and lakes with the waste material from sulphite mills. In more recent years, the pulp industry has realized the seriousness of this pollution problem and to relieve the situation numerous attempts have been made to either dispose of the waste liquor or put it to a profitable use.

In the State of Washington, an attempt was made in the past to pump this liquor away from habitations where it might dry up in the sun or filter down into the ground, and in the East many types of trickling filters and other methods of recovery have been tried. Sulphite waste liquor has also been used as a road binder. The sugar content of it has been used for the production of alcohol and fodder yeast by fermentation.

For a number of years, engineers and chemists of the pulp division of the Weyerhaeuser Timber Company worked with this problem of the elimination of dumping waste liquor into the Columbia River. They felt that in the magnesium oxide base they had the most feasible answer to the problem of the recovery of chemicals and upon presenting the results of their early laboratory findings and calculations to the board of directors of their company, they were authorized to proceed with what is probably the most ambitious program of sulphite waste liquor recovery ever attempted by a single member of the pulp and paper industry.

MAGNESIUM PROCESS

In 1939, after the test tube stage had been passed, a pilot plant capable of taking the output of one digester was constructed. This plant consisted of an evaporator, suitable furnace for burning the liquor, the boiler to recover the heat of combustion in the form of steam, and an absorption tower system for the recombining of the chemicals recovered in the cooking liquor.

This pilot plant operated for nearly a year and the results were so satisfactory as to warrant converting the entire pulp mill to this new type process. As a further check, the entire process was recalculated and this, together with pilot plant results, were checked by scientists at the Institute of Paper Chemistry.

About the same time, other work of somewhat similar nature was being conducted by the Howard Smith Paper Company in Canada in co-operation with The Babcock and Wilcox Company, manufacturer of boilers and allied equipment. A pooling of data and experience of the two companies was entered into and it was decided the first plant to attempt full-scale operations would be established at the pulp division of the Weyerhaeuser Timber Company in Longview. However, as this experimental work was completed very shortly before the outbreak of World War II, it was necessary to await the end of the war before materials could be had to start such a building program.

The conversion to magnesium sulphite of the present lime or calcium based sulphite pulp mill of the Weyerhaeuser Timber Company's pulp division at Longview, Washington, was based on the desire of the company to accomplish three things:

1) To recover chemicals used in the production of the pulp
2) To recover power from waste wood products
3) To eliminate stream pollution from waste liquors

Since the discovery of the sulphite process by Tilghman in 1867, attempts have been made from time to time to utilize bases other than calcium. Tilghman recognized the possibility of using bases other than calcium and the first commercial sulphite mill, built by Ekman in Sweden in 1874, for a time employed magnesium as a base.

However, pulp manufacturers turned to the use of limestone for the preparation of cooking acid because of its very low price compared with other bases.

In the normal sulphite process, wood chips are cooked in digesters with a cooking acid produced by the action of sulphur dioxide upon limestone in the presence of water. The sulphur dioxide is made by burning melted sulphur in a controlled atmosphere. It is interest-

ing to note that in the production of this type of pulp about half the wood substance in the chips is dissolved in the cooking liquor, and the cellulose, which makes up the remainder, is produced as pulp. Thus for every ton of pulp, a ton of waste is also produced. This waste material is made up of lignin, carbohydrates, chemicals from the cooking liquor, and water.

Many attempts have been made to evaporate and burn sulphite waste liquors in which lime has been used as a base for preparing cooking acid. When lime base waste liquor is evaporated, however, many difficulties are experienced because of the separation of lime scale in the evaporators, requiring extensive maintenance of this equipment. Furthermore, when lime based waste liquor is burned, the resulting ash is made up of lime compounds which cannot be recovered readily in a form suitable for the preparation of cooking acid.

In the course of experimental work with bases other than lime for the preparation of cooking acid, it was found that if magnesia was used as a base, the waste liquor could be evaporated without the scaling problems which occur with lime.

Furthermore, when the evaporated liquor was burned, the magnesia could be recovered in the form of active magnesium oxide while the sulphur present in the waste liquor would pass off as sulphur dioxide in the combustion gases. The magnesium oxide could then be made into a slurry with water. This slurry has the properties of being able to combine with the sulphur dioxide gas when in contact with it to reform magnesia base cooking liquor.

In the process of burning, the waste liquor was found to give off heat to generate sufficient steam and power to supply part or all of the steam and power required for the entire process depending upon equipment efficiency and chip cooking conditions.

Thus, it is readily seen that with a magnesia base sulphite process used with proper equipment there is no waste liquor to be disposed of by dumping into lakes or streams, steam and power is generated, and chemicals are recovered.

Because of the relatively high cost of magnesium oxide compared with limestone, high efficiency throughout the process must be maintained and costly and well thought-out equipment and methods employed.

[*To give the reader a brief summary of just what goes on in the magnesium oxide base sulphite process in the new Weyerhaeuser conversion the following information now available is given:*]

▶▶▶ The cooking of the chips in the digesters is done in the same manner as with the normal lime base sulphite process, but magnesium oxide is substituted for the lime. At the end of the cooking period, the digester is gased down to atmospheric pressure to recover all available sulphur dioxide, and instead of the pulp being blown from the digester as in the normal sulphite process, the pulp is washed out with waste liquor into dump chests.

Following this, the pulp is put over vacuum washers and the strong cooking liquor contained in the pulp is saved. This liquor is then put through multiple-effect evaporators and disc evaporators where the excess water is evaporated and the solid contents of the liquor increased to a point where it can be burned under a boiler in equipment similar to a conventional oil burner. The liquor, when it is introduced into the furnace of the boiler, consists of water, lignin, and carbohydrates from the wood, magnesia and sulphur from the cooking liquor. In the process of combustion, the lignin and carbohydrates produce heat. The magnesia is transformed into magnesium oxide and the sulphur passes off in the combustion gases in the form of sulphur dioxide.

Thus steam is generated in sufficient quantities, if the waste liquor is efficiently evaporated and burned, to furnish all or part of the steam and power necessary for the process. The magnesium oxide is collected from the furnace gases, mixed with water and pumped through absorption towers. The combustion gases containing the sulphur dioxide are piped to these same absorption towers where they come in contact with the magnesium oxide slurry, and the cooking acid is formed by the chemical combination produced.

Thus it is seen that the cycle is completed—from cooking acid back to cooking acid. Naturally no process is 100 per cent efficient and some small losses incur in the process. It is, therefore, necessary to add small amounts of fresh magnesium oxide and sulphur dioxide to the cooking acid to maintain the rate of production required. However, these are extremely small and despite the rather high cost of magnesium oxide, the process is economically feasible.

It all sounds very simple but it must be remembered that on the basis of the production of 285 tons of sulphite pulp per day, which is the capacity of Weyerhaeuser's Longview mill, this means the handling, evaporation, and burning of 285 tons of waste liquor and entails vast expenditures in buildings and equipment. This portion of the Weyerhaeuser expansion program cost in excess of $3,000,000.

AIR VIEW OF PULP DIVISION

(Identification Numbers, Illustration on Opposite Page: 1 to 8 inc., old buildings; 9 to 26, new units.)

1. *Chip Storage for Sulphite Pulp*
2. *Sulphite Digester House*
3. *Acid Plant (will be replaced by smaller acid plant when new MgO recovery system is operating)*
4. *Filter Plant*
5. *Sulphite Pulp Screen Room Building*
6. *Sulphite Bleach Plant and Screen Room*
7. *Sulphite Pulp Drying Machine Building*
8. *Sulphite Pulp Storage Warehouse*
9. *New Dump and Washer Building for Sulphite Waste Recovery System*
10. *Section of Boiler House which contains Sulphite Waste Recovery Boilers*

10a. *Section of new Power Plant which contains the Turbine Room*

11. *New Sulphite Acid Plant*
12. *Material and Supplies Store House for both Pulp Mills*
13. *Machine Shop for both Pulp Mills*
14. *Concrete Silo Chip Storage for Sulphate Mill*
15. *Sulphate Digester House*
16. *Liquor Evaporator Building—tall section for sulphate liquor, low section for sulphite liquor*
17. *Sulphate Recovery Boiler*

17a. *275-ft. exhaust stack from Sulphate Boiler*

18. *Lime Kiln Building, part of Liquor making department for Sulphate Pulp Mill*
19. *Causticizing Building for Sulphate Cooking Liquor*
20. *Sulphate Pulp Screen Room*
21. *Sulphate Bleach Plant*
22. *New Filter Plant to take care of increased water requirements*
23. *Sulphate Pulp Storage Warehouse*
24. *Sulphate Pulp Storage Warehouse*
25. *Pulp Division Research Department*
26. *Pulp Division Office*

One of the most vital points of this process, as mentioned above, and one which is of paramount interest to the citizens of our Northwest, is the production of steam and power by burning of the waste liquor.

Sawmill waste wood, which has in the past been utilized as hog fuel to produce steam and power to operate the calcium base sulphite mill, such as the Longview Weyerhaeuser mill previously was and such as all other sulphite mills are, may now be used for other purposes such as the raw material for the production of kraft pulp which utilizes fir wood. Thus the magnesium oxide sulphite process not only eliminates river pollution but is another big step toward a more complete and efficient utilization of the timber resources of the Pacific Northwest by converting the energy contained in what was formerly wasted into steam and electric power.

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NEW KRAFT MILL

▶▶▶ THE NEW MODERN sulphate pulp mill of the Weyerhaeuser Timber Company's Pulp Division at Longview, Washington, went into production during the month of August.

This plant, the Pacific Coast's newest pulp mill, which will have a capacity of 200 tons per day, and the new recovery plant have meant an outlay in excess of $10,000,000, informed sources in pulp and paper circles declare.

The new modern sulphate pulp mill is designed to make a high quality bleached kraft pulp primarily from material which previously has been used as hogged fuel or left in the woods as waste.

Barking of whole logs before they enter the sawmill will provide a greater portion of slabs, edgings and other normal waste material that is free of bark and which is desirable as raw material for quality pulp production. This, together with small logs produced by the prelogging operation and prepared in the small log chip plant, will constitute the main supply of raw material for the new plant.

In the digester building five vertical, steel digesters, 11 ft. in diameter and 40 ft. in height, are used. These digesters are fitted with circulating systems, whereby the liquor is strained from the chips near the bottom of the digester, pumped through a tubular heat exchanger, and thence back into the digester near the top. In this manner uniform temperature conditions and chemical concentration throughout the digester are maintained. After filling the digester with a weighed amount of chips and a measured quantity of cooking or white liquor which contains the correct amount of chemical to give the degree of cooking desired, the digesting or cooking cycle is begun. The contents of the digester are heated to the desired temperature by adding steam to the heat exchanger, thus heating the circulating liquor. Maximum cooking temperature is about 340 Fahr., at which temperature the digester pressure is about 110 lb. psi. The flow of steam is automatically controlled to give the desired temperature rise.

At the end of the cooking cycle the digester contents are "blown" into the top of the blow tank, a round, vertical tank fitted with a conical bottom. Considerable quantities of steam are released during the "blow"; this is piped to a condenser tank. A deluge of shower water condenses this steam and picks up its heat content. By heat exchangers, this hot water is used to heat filtered water for subsequent pulp washing operations.

The blow tank acts as a surge tank between the digesters and brown stock washers. Strong waste black liquor from previous cooks is used to dilute the stock in the bottom cone of the blow tank to consistencies low enough for pumping. This diluted stock, at automatically controlled consistency, is pumped to three Jonsson knotter screens for removal of knots and any uncooked chips.

Following the knotters, the stock flows by gravity to the first of three Oliver vacuum washers. Through these three washers, each 14 ft. by 8 ft. in diameter, the flow of stock is countercurrent to the filtrate or wash water. Hot, fresh water is used as shower water on the last washer, the filtrate from this washer then in turn is used as shower water on the second washer, and the second filtrate is shower water on the first washer. In this manner practically all of the waste liquor and chemical are removed from the pulp, yet there is a minimum dilution of the waste or black liquor. Following the washers, the brown stock is pumped to two storage tanks.

The black liquor consists of about 85 per cent water and 15 per cent solids. The solids represents about 55 per cent of the solid content of the original wood removed by the cooking operation and present in the waste liquor primarily as sodium organic compounds. It is necessary to remove most of this water by evaporation so that the resultant waste liquor, of about 50-55 per cent solids content, will burn. For this evaporation, a six-body, quintuple effect evaporator, manufactured by General American, is used. In this evaporator about 4 lb. of water is evaporated for each pound of low pressure steam used. Here, again, the flow of steam is countercurrent to the liquor. The steam at about 25 lb. pressure, is used for heating the thick liquor in the fifth effect evaporators. The steam vapor driven off is the heating medium for the next effect at slightly lower pressure. This counter flow of steam vapor to liquor is continued until at the first effect, where the black liquor is first admitted, the vapor is removed under vacuum by a water jet condenser.

The thick black liquor is then pumped to the disc evaporators, manufactured by D. J. Murray Company, where a small amount of water is removed by the recovery furnace hot flue gases.

Any loss of chemical is made up by adding salt cake, or sodium sulphate, to the heavy liquor at this point in the process.

The liquor is then sprayed into the B and W Tomlinson furnace for recovery of the heat and chemical. There is sufficient heat value in the waste liquor from the noncellulose portion of the wood removed by cooking to generate about 9,000 lb. of steam at 650 lb. psi pressure for each ton of pulp produced. This then serves as a source of steam and power for the mill operation.

In the reducing atmosphere of the furnace the sodium organic compounds are reduced to sodium carbonate and the salt cake to sodium sulphide. This is removed as a smelt or molten slag from the furnace and dissolved to form green liquor.

The flue gases, after passing through the disc evaporators, may contain a small quantity of fly ash, chiefly salt cake not reduced to sodium sulphide. To remove this, a Cottrell electric precipitator, operated at about 75,000 volts, is used. This type of equipment, manufactured by the Research Corporation of America, is frequently used to remove the soot particles from industrial flue gases in large cities.

The green liquor, containing the recovered chemicals, is pumped to storage ahead of the causticizing department. The function of the causticizing room is to convert the sodium carbonate to caustic soda, or sodium hydroxide, thus white liquor, so that these chemicals can then be used again for the cooking operation.

A Dorr liquor making system is used. The green liquor is clarified by a continuous settling process. The dregs from this clarifier are washed further to remove any chemical, then discharged as waste. The clarified green liquor is treated with a slaked lime slurry in continuous flow mixing, or causticizing, tanks. The lime reacts with the sodium carbonate to form caustic soda and calcium carbonate. The calcium carbonate is settled out continuously in the white liquor clarifier, and the clear liquor, now white liquor, is pumped to storage for use as cooking liquor. The lime mud, or calcium carbonate sludge, is washed in a second clarifier to remove any caustic chemical, then washed further and thickened on an Oliver vacuum filter.

The washed sludge is burned in a rotary lime kiln to reform burnt lime for reuse in the causticizing process. The Traylor kiln is 250 ft. long by 7 ft. in diameter, brick lined and oil fired. Pebble limestone is added with the lime mud to make up any process losses.

The reburned lime from the kiln is slaked in a Dorr continuous slaker.

Following the brown stock washer at the digester building the brown

stock is screened to remove any uncooked slivers or portions of knots which were removed by the knotter screens. The screen room consists of twelve lines of flat screens, eight for brown stock and four for bleached stock.

These screens, made by Improved Paper Machinery Corporation, are bronze vat, chromium plated bronze plates, and equipped with Dunbar drives. Each line consists of four sections with fourteen plates per section. Stainless steel for piping and stock flumes has been used liberally, to avoid contamination of the pulp with rust or dirt particles.

Following the screens the pulp is thickened over Valley Iron Works open type deckers. The effluent white water is used for diluting the stock going to the flat screens.

In the bleach plant, six separate bleaching stages are used. In this manner the pulp at no time is subjected to conditions drastic enough to cause an appreciable loss in strength properties. Except for the caustic extraction stage, where tile lined steel cells are used, all bleach cells and storage or dump chests are of tiled lined concrete construction. The tile linings were made and installed by Stebbins Engineering and Manufacturing Company.

The different steps or stages of bleaching are as follows:

1. Chlorination
2. Caustic neutralization
3. Hypochlorite
4. Caustic extraction
5. Hypochlorite
6. Hypochlorite

Following each step the pulp is thoroughly washed over an 8 ft. by 12 ft. Oliver vacuum filter. Except for the first two stages, high densities are used which tends to make cleaner pulp. Also, in order to have better quality control, batch processes are used so that any necessary changes in chemical addition or bleaching conditions can be made as required.

Following bleaching, the pulp is screened, as previously mentioned, to remove any dirt which may have been picked up in process.

The thickened bleached stock is pumped to storage tanks at the pulp drying machine. Vortraps, made by Nichols Engineering Company, are used to separate from the pulp going to the machine wire any dirt which may have been small enough to pass through the flat screens, yet has a specific gravity higher than that of pulp or water.

The Rice-Barton machine, equipped with a Minton vacuum dryer, is very similar to that used for the sulphite mill. This machine, producing a sheet 150 in. wide at about 250 ft. per min., has a capacity of about 10 tons air-dry pulp per hour. The fourdrinier wet end is removable to facilitate easy changes of the wire. Where possibilities of contamination exist, noncorrosive metals have been used.

The Minton vacuum dryer, which consists of a housing for the thirty-two drying cylinders, is operated at about 26 in. of mercury vacuum. Thus it is possible to dry the pulp without subjecting it to excessively high dryer surface temperatures which would cause some degradation of the pulp.

A Beloit Iron Works cutter is used to cut the pulp into 30 by 30 in. sheets. These are automatically stacked by a lay-boy into approximately 400 lb. stacks, then moved by conveyor to scales. After accurately adjusting the weight, the stack is pressed by a 600 ton hydraulic press to a compact bale. This bale is wrapped and tied with wire using Parker automatic tying machines.

The finished bales of pulp are then moved by belt conveyor to the shipping warehouse. Power fork lift trucks are used for loading in cars or boat for shipment to the customers.

The new kraft mill is a step to more fully utilizing the products of the forest for conversion to products of value to our economy. Unlike the sulphite process, which only utilizes nonresinous woods, the kraft process can pulp any wood species. This permits the utilization of a great many more sources of wood, such as cull logs, relogging and prelogging, sawmill waste and farmer wood of any species.

The problem of utilizing the various sources of wood has long been given considerable attention. The first significant step to better utilization of wood was taken in 1945 when the large hydraulic log barker was installed to supply chips to the present pulp mill. This unit was built after a similar installation in the Everett mill of the company had been pioneered and brought to a high degree of efficiency. This device consisted of means to rotate a log and apply a high pressure water jet to the surface which effectively removed bark without cutting off any wood. A pump requiring 1,000 hp. and delivering water at 1,400 lb. psi pressure is used. Approximately 1,000 gpm of water is used.

Coincidental with the hydraulic barker, a large chipper, capable of chipping whole logs 40 in. in diameter was installed. This chipper is 175 in. in diameter, and weighs 40 tons. A log is fed into this chipper and converted to chips at the rate of 1 ft. per second.

The use of the hydraulic barker and whole log chipper effected wood savings of approximately 20 per cent. Where five logs were previously used, four logs were now used to produce the same quantity of pulp.

In addition to its original job of supplying chips for the present sulphite mill, the hydraulic barking and chipping plant will chip cull logs for the new kraft mill.

In addition to the chips supplied by the present barking plant, wood waste from other sources is to be utilized. To permit the utilization of small logs from prelogging and relogging operations, a hydraulic barker, manufactured by the Allis-Chalmers Company, has been installed. This unit was designed to utilize the small logs prevailing in Eastern Canada, New England and the Middle West.

In this device, the log is carried past a jet of high pressure water by means of a worm roll and fluted roll which imports rotary motion and longitudinal travel to the log. Logs 8 ft. long and up to 18 in. in diameter are processed.

A 10-knife chipper, manufactured by the Carthage Machine Company, 90 in. in diameter, is used to convert the barked logs to chips.

The Allis-Chalmers barker will permit the use of small logs purchased from farmers, as well as waste from company logging operations.

The use of sawmill waste, such as slabs and edgings, is also planned to provide wood for the kraft mill operation. The use of hydraulic barkers in the pulp industry has stirred the imagination of sawmill men throughout the industry as to what savings in lumber cutting may be effected by sawing barked logs. Tests on logs barked in the pulp mill barkers have shown that an increase in lumber yield from logs could be effected which would justify the installation of a barker for saw logs. A barker for saw logs has been installed at Mill 1. This machine will bark logs 40 ft. long. The use of barked logs will permit the edgings and slabs to be diverted directly to chippers without being cleaned free of bark.

At other points in the sawmill, clean wood now going to the hogs will be picked from waste conveyors and converted to chips.

The chips for the kraft mill will be gathered from the various points of production and conveyed to the chip storage by 3,500 ft. of belt conveyor. The conveyor is carried over existing buildings and structures by a steel structure supported on steel bents. The design of this conveyor structure is unique in that while being entirely of steel and weighing but 80 lb. per ft.,

it is too light to carry anything but chips. A Robertson protected metal housing insures against the infiltration of airborne dirt into the chips.

A unique feature of the mill is the chip storage. Four concrete silos, 48 ft. in diameter and 60 ft. high, are provided. These are provided with rotary discharge feeders to remove chips from any desired point or points in the silo. The silos are of slip form construction with a poured concrete roof. Storage for approximately four days operation is incorporated.

In the construction of the magnesium oxide conversion and the sulphate pulp mills of the Pulp Division, Weyerhaeuser Timber Company, all buildings and tanks were supported on piling.

A great many of these are a type somewhat new to this area. They consist of regular untreated wood pile driven so that the top is far enough underground to insure the entire pile being saturated with water at all times, thus guaranteeing unlimited life to the piling. Attached to the top of the wood pile by a patented process is a steel casing, extending either to or just under the surface of the ground, as required by the building design. This casing is poured full of concrete and the result is a composite pile of indefinite life which allows building footings to lay practically on the surface and does away with huge and costly excavations for deep seated foundations usually required.

Exclusive of the new pumping house in the river, whose 190 wood piling were driven during the summer of 1947, a total of 8,807 piles were driven between April 24 and December 11, 1946. Of these, 5,971 were the composite piles and 2,836 were regular wood piles. These were driven by The Raymond Concrete Pile Company of New York City.

Before the brown colored pulp, peculiar to all unbleached sulphate processes, emerges snow white from the new bleach plant of the Pulp Division of Weyerhaeuser Timber Company, it must go through six complete stages of bleaches and be washed six times.

There are four chlorination cells, one caustic neutralizing tower, four caustic cookers, and seventeen high density bleachers. To agitate, pump and convey, wash and add bleach liquor and chlorine to the pulp, and also ventilate the building and bleachers, there are installed 42 reduction gears, 34 pumps, 4 belt conveyors, 6 Oliver 8 ft. by 12 ft. washers, 7 fans, and 89 motors totaling 3,095 hp.

This bleach plant embodies the advantages and flexibility of the batch system in a continuous operation. Pulp is treated in 6-ton batches. Each batch can be tested and controlled separately. However, the flow of pulp and incidental chemicals and water through the plant is continuous.

To insure the utmost in cleanliness of pulp in the Weyerhaeuser mill, all tanks for pulp storage are tile lined. In addition to this, all towers and tanks exposed to the action of corrosive liquids are either tile or brick lined, depending on the temperature to which they are subjected.

In the conversion of the present sulphite mill to magnesium oxide cooking, there were installed over 71,000 sq. ft. of special acidproof ceramic linings in which over 193,000 pieces of special radius and special shaped brick and tile were utilized. In addition to this, a great number of special ceramic beams were used to form the grid work in the absorption towers, plus special carbon beams and columns to support this grid work.

In all, a total of 34 carloads of the above material, of over 80,000 lb. each, were shipped in to complete the conversion.

In the sulphate mill, in excess of 79,000 sq. ft., utilizing slightly over 140,000 special shaped tile, to withstand the acid and alkaline solutions encountered in the process, were installed. This added up to 14 carloads of over 80,000 lb. each.

The above does not include the carloads of Portland cement, litharge, glycerine, quartz sand and other materials used in installing these linings. This is one of the largest jobs of ceramic lining ever installed in a pulp mill.

Sound Labor Relations... a Practical Approach

O. C. COOL, Director
Labor Relations Institute

▶▶▶ I AM OFTEN ASKED, "When we start a labor relations program, where is the right place to begin?"

The answer could easily be, "Everywhere—and at once!" A well-rounded program of employee relations has many "starting points." All too often, one has to begin by correcting some emergency situation, such as an unbalanced wage structure filled with inequities which have created "sore points" which have festered and led to a slowdown or to plant-wide low morale, or perhaps a supervisory breakdown which has permeated lower management, with a resulting bad effect on the rank and file. Then the only thing one *can* do, before launching a long-term program, is to cure the infection before building up the patient.

There are a number of ways to approach the problem of where to begin in cases where no emergency situation has arisen to set up its own vexatious priorities. There is, for instance, the legal approach. The Labor Management Relations Act, for example, provides a skeleton or framework on which one can begin, by setting up procedures and methods which place one's plant in conformance with the requirements of the law. Other laws of the Federal Government place their imprint on labor relations; they include the Fair Labor Standards Act, the Portal Pay Act, the minimum wage law—and there are state laws to reckon with, as well.

Union negotiations, and ensuing relations with the union, also provide a nucleus of needs—grievance handling, wage scales, foreman relations with shop stewards, rest periods, shift differentials, seniority, transfers, fringe benefits, management prerogatives, etc.

The introduction of some basic change—such as a new incentive wage, or a reorganization of the work-force due to new plant layout or new labor-saving equipment, often provides a "starting point" of its own. In many cases where such changes are under consideration, a broad labor relations program develops out of the need for "selling" the change—and its benefits—to the employees and the community.

In the absence of compelling factors which themselves dictate how and where the program should commence, there is an alternative approach which, more than any other, possesses the virtue of employer good will toward the workers. That is the human-relations approach, born of a desire to unify and harmonize all elements in the plant into a single, unconquerable team. To me, it is the best approach of all, because it is bedded firmly in the rock of human sympathy and common understanding. It succeeds where others frequently fail, and its fruits are long lasting. It begins with a realization, on

(Turn to page 880)

The Paper Industry a Victim of Reciprocity

WARREN B. BULLOCK, Manager
Import Committee of the American Paper Industry

▶▶▶ THE AVERAGE DUTY rate on dutiable papers, based on 1947 imports, is now 12.28 per cent. The average rate of duty on all dutiable commodities, according to the United States Tariff Commission, is 15.3 per cent.

This comparison is the basis for the belief of the domestic paper manufacturers that the paper industry has been the chief target, among all major industries, of efforts to reduce tariff barriers, through Reciprocal Trade Agreements.

The Paper Industry is the most sensitive of all American industries to tariff changes, has been most violently disturbed by changes made in the past, and has been subjected to heavier duty rate reductions than any other manufacturing group of comparable size.

The Paper Industry's reciprocity troubles began in 1913 when newsprint was placed on the free list. The Newsprint Industry moved to Canada and domestic newspapers are now forced to rely on that country for three quarters of their annual requirements.

Four years earlier, in 1909, wood pulp was placed on the free list. In 1947, imports of pulp were valued at $257,394,325 and imports of standard newsprint, $343,191,758. For a generation foreign pulp and newsprint manufacturers have been enjoying unrestricted access to the United States market. Imports of pulp and newsprint in 1947, totaling over $600,000,000 were 13 per cent of the total value of all commodities imported into the United States that year. Thus, the United States pulp and newsprint industries alone have contributed more to the furtherance of international trade (at the expense of domestic producers) than any other single domestic industry.

Partial destruction of the domestic newsprint industry happened through reciprocity. It not only *can* happen again, but is *now* happening in respect to other grades. In the last three years United States companies have made commitments for the construction or expansion of Canadian mills totaling an investment of $175,000,000 in fields other than newsprint.

A survey of the effects of Reciprocal Trade Agreements tells its own story.

Under the Geneva Agreements, duty reductions were made on 47 grades of paper but there were no reductions on the heavy tonnage grades, such as groundwood and book grade printing papers, the major wrapping paper grades, or plain paper boards. It must be realized, however that under the Reciprocal Trade Agreement Act, it is still possible to cut in half the rate on these major grades now ranging from approximately 10 to 25 per cent. Serious as have been the effects of duty rate reductions already effected, further slashes in rates on these grades would be destructive.

The United States paper industry was the first industry to feel the effects of a reciprocity program and as the result of successive trade agreements is still the industry whose markets have been most violently distorted by changes in duty rates.

The first reciprocal agreement negotiated by this country placed newsprint on the free list—a step for which no reciprocal concession was secured. Not only did the newsprint industry migrate to Canada, but mills formerly making this grade were forced to dismantle their plants or turn to the manufacture of other grades. This grade shifting demoralized the industry for a score of years. In 1913 there were 70 newsprint mills in the United States, today there are only three United States companies making newsprint exclusively for sale. True, some other mills owned by newspaper groups are making newsprint for their own use and selling a small surplus. This step has been taken to guarantee the interested publishers a source of supply, inasmuch as manufacturers driven out of the field by duty free competition, have not dared risk investment in new mills.

The newspaper publishers have been the final victims of this practical elimination of a domestic industry. Because there is no domestic output to stabilize prices, newspapers are buying thousands of tons of paper at 10 cents per pound and in some cases 15 cents. In fairness it must be recognized that the Canadian mills have not in any instance taken advantage of the panic buying in the United States to raise prices to the level charged by European mills. The trend seen in the newsprint field is now in evidence in closely related grades, groundwood printing papers. Some grades, formerly made in the United States, are now principally imported from Canada. Other grades are migrating at an accelerated pace. Novel news, formerly produced in huge quantities in this country, has ceased to be a United States product. Pencil tablet and poster papers are following novel news to Canada.

Some of the specific results of the program to reduce duty rates are shown in the following examples of increased imports resulting from various trade agreements.

Printing Papers.—The duty rate under the Tariff Act of 1930 was one fourth of 1 cent per pound and 10 per cent ad valorem. This was reduced by the Trade Agreement with Canada, effective Jan. 1, 1939, to one-fifth of 1 cent per pound and 5 per cent. Imports in 1938, prior to the reduction, totaled 9,500 tons valued at $532,512. In 1939, the first year after the rate was changed, imports rose to 13,400 tons valued at $729,624. In 1947 imports were 74,700 tons, valued at $7,953,055.

Plain Paperboard.—The duty rate under the Act of 1930 was 10 per cent with a countervailing rate proviso imposing on any imported board a rate of duty equivalent to that levied by the country of origin. The Canadian rate for such board was 25 per cent, and duty was collected on Canadian imports at this rate. By the original Reciprocal Trade Agreement Act this countervailing duty proviso was canceled. Imports of board from Canada in 1933 totaled 1,768,079 pounds, valued at $28,201. Although the countervailing duty rate nullification was not in effect until the Trade Agreement Act was passed, June 12, 1934, Canadian imports in that year totaled 5,906,843 pounds, valued at $92,794. In 1936, the first full year of the Agreement Act, imports were 10,100,342 pounds valued at $139,257. Imports from Canada in 1947 had risen to 25,832,634 pounds, valued at $1,187,821.

Tissue Paper.—The rates of duty on various tissue papers were reduced by Trade Agreements with Canada and the United Kingdom effective January 1, 1939. The new rates, which segregated these papers by weights and values were a reduction of 50 per cent on light weight and 33 and 1/3 per cent on heavier weights. Imports of all tissues in 1939 totaled 1,310,919 pounds, valued at $781,027. Despite the war developments in 1939 when the lower rates became effective, imports increased to 1,763,306 pounds valued at $905,758. In 1947 imports had risen to 2,902,868 pounds valued at $999,498.

Carbon Papers.—A specific example of the effect of the duty re-

duction is in carbon papers. In 1938 imports totaled 663,122 pounds valued at $330,711. In 1939 when rates were reduced on January 1, the volume rose to 1,120,145 pounds valued at $536,020. In 1947 imports were 853,767 pounds valued at $452,630. Inasmuch as this grade is imported almost entirely from the United Kingdom, England's industrial difficulties explain why the volume has not reached prewar totals.

Vegetable Parchment.—Under the Act of 1930 the duty rate was 3 cents per pound and 15 per cent; this was reduced by the Trade Agreement with Belgium, effective May 5, 1935, to 2 cents per pound and 10 per cent and by the Geneva Agreements to 1 cent per pound and 5 per cent. In 1934, imports were 89,317 pounds valued at $26,283. In 1935, though the reduced rate was in effect only eight months, imports rose to 176,759 pounds, valued at $43,832. Imports since the war have been confined to high priced spinning parchment, foreign mills not having yet returned to volume output of wrapping grades.

Simplex Decalcomania.—The duty rate of 5 cents per pound and 10 per cent was reduced to 2½ cents per pound and 10 per cent by the British agreement, effective January 1, 1939. Imports in 1938 were 31,717 pounds valued at $6,004. In 1939, the first year under the agreement, imports rose to 114,529 pounds, valued at $19,685. In 1947 the imports were 356,344 pounds, valued at $92,005. The rate has been cut again under the Geneva Agreement to 1¼ cents per pound and 5 per cent. This material is made by a single English company. One American company produces the bulk of the domestic product. Establishment of this industry was only possible through the protection originally provided.

Kraft Wrapping Paper.—The rate in the Act of 1930 was 30 per cent. This was reduced by the Trade Agreement with Sweden, effective Aug. 5, 1935, to 25 per cent, and was further reduced to 20 per cent by an agreement with Finland, effective Nov. 2, 1936. Imports in 1934 were 4,300 tons valued at $317,809. In 1935, even though the reduced rate was only in effect five months, imports were 12,340 tons, valued at $815,790. In 1936 imports were 24,000 tons, valued at $1,536,148. Imports in 1937 were 16,600 tons, valued at $1,176,711, and in 1947, 10,900 tons, valued at $1,766,939.

Sulphite and Other Wrapping Paper.—The rate in the Act of 1930 was 30 per cent. This was reduced by the Swedish agreement to 25 per cent, effective August 5, 1935. Imports in 1934 were 520 tons, valued at $37,374. In 1935 imports were 550 tons, valued at $42,876, and in 1936, 660 tons, valued at $52,740. In 1947, however, imports were 11,080 tons, valued at $1,856,584.

Standard Newsprint. — Placed on duty free list in 1913. The previous duty rate was 3/16c per pound on paper valued at not over 2½c per pound, with a higher rate on better grades. Imports totaled 315,000 tons in 1913; in 1947 imports totaled nearly 4,000,000 tons.

In view of this demonstrated outcome of a reciprocity policy, it is not surprising that the domestic paper industry has consistently opposed the extension of the program which has already worked such catastrophic changes in its economic position.

▼

Sound Labor Relations

(Continued from page 878)

the part of management, that employees, regardless of rank in the plant and position in the community, have definite aspirations, hopes, attitudes, likes and dislikes—and that these in turn have a bearing on their feeling toward their jobs and their employers.

1. *Job security.* This is a basic urge, one which cannot be waved away or disregarded. It is the fundamental reason for unions; if there were no insecurity, or fear of insecurity, unionization would not be the factor it is today. The unions make their greatest gains where suspicion and distrust hold sway. Everything that counters and overcomes the fear of separation from the job is in the interest of good labor relations.

The incompatibility of labor-saving devices and job security is more imaginary than real. Case after case could be cited in which modernization and technological change have *created* job security—at higher wages and better profits, and with substantial reductions in prices. Even a program which includes separations for some can be "sold" to the remainder—and their union. We at The Institute know—because we solve such problems again and again, in the ordinary course of our work.

Insecurity is not just a matter of relations between the individual worker and his company. Declining sales due to recessions or shortages; rising prices which jeopardize the worker's budget; basic changes in demand for the company's products—all weigh on the intelligent employee's mind. He feels he has a right to know how things are going with the company, because everything he has is at stake. That is why he craves information about the company's progress—and why he should be protected against rumors that make him feel insecure.

2. *Significance as an individual.* It is becoming bromidic, but is nonetheless true, that every worker is an individual human being with a personality all his own—not just a cipher on a list of numbers. Good labor relations respects his individual dignity in many other ways—by giving him every possible choice in the selection of teammates; by coupling a "reason why" with every order or plant regulation; by protecting his health through safety programs and sanitation; by providing adequate and attractive facilities for lunch and rest periods; by planning and conducting recreation and social activities, and by capitalizing every opportunity to "build up" employees in their own eyes and in those of their fellow-workers.

3. *A chance to get ahead.* "Where do I go from here?" is a fundamental question with most employees. Hence the importance of training plans and promotion schedules which give them a chance to earn more money and to do work involving higher skills. "Getting ahead in the world" is an old-time American custom; it is also a force for good wherever it is used—and used properly.

4. *Fair - and - square compensation.* This involves not only the removal of inequities within the plant and in the area, but also the elimination of puzzling or intricate methods of computing piecework pay or incentive wages, so that each worker can tell for himself how much his envelope should contain. It also includes a fair distribution of overtime and other premiums.

5. *A formalized grievance procedure.* This is a "must" which should exist in every company—and so is a constant effort to see that the procedure is used. When the grievance machinery gathers dust, or is jammed through neglect or indifference, frustration and resentments pile up, until they explode. It is far more than a safety valve, however. As one employer put it recently, "We have learned more about how to manage (our labor relations) from our grievance system than from all other sources put together."

Add these together, with modern methods, stir in a batch of old-fashioned *good faith in all dealings*—including if possible those with the union which the workers have chosen to represent them—and you have a rock-bottom, practical, effective program of labor relations. It will succeed, if you keep it fresh and alive and up-to-date, because it is bound to reflect management's own desire for good human relations with the employees.

Mrs. Mary Betz, M. T., points to 111-day safety record she has just chalked up—four days better than the best previous record

A Safety Program Founded on Accident Prevention . . . not First Aid

HOWARD KROLL
Chairman, Safety Committee
Blandin Paper Company

▶▶▶ FOR THE PAST FOUR years our company has received the Governor's Safety Award for "Outstanding Safety Achievement in the Paper Industry," from the Minnesota State Safety Council. This award is given each year.

Last year our mill had eleven lost-time accidents and a frequency rate of 15.6 per cent for the hours worked by our 300 employees. Not a bad record, and well below the average, but we think that even one accident is too many.

Blandin Safety Record 1942-1947

Year	Lost-time Accidents	Accident Frequency (per cent)
1942	20	33.7
1943	27	49.2
1944	35	58.4
1945	27	47.6
1946	10	14.7
1947	11	15.6

I call our safety program "Accident Prevention . . . not First Aid." When I was asked to take charge of the safety program at Blandin back in 1942, the mill's accident record had begun to worry both the president, C. K. Blandin, and C. K. Andrews, general manager. Safety activities had been carried on for years, but those in charge of them often lacked the authority to enforce their recommendations.

We decided that safety was the foreman's responsibility—that in 80 per cent of the cases where an accident occurs, it is because the foreman has been lax in his training or in his supervision of the men under him.

I was then (and am today) foreman of the finishing room, and believed there was no better way to make a foreman safety conscious than to throw this responsibility in his lap.

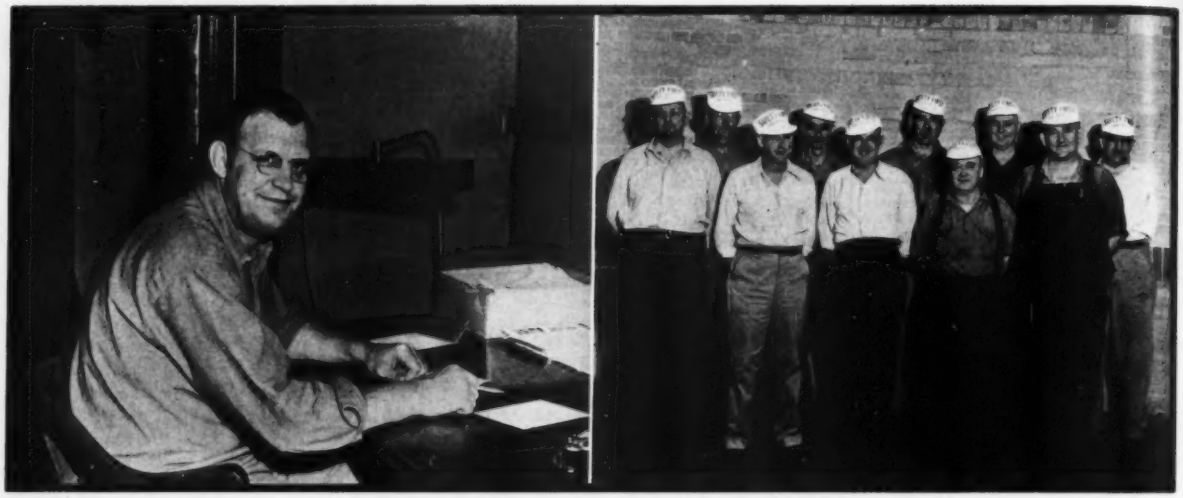
Our first move was to form a safety committee of ten foremen, with each department represented: Maintenance, Power House, Yard and Wood Room, Machine Room, Pulp Mill, and Beater Room. Each foreman was to assume, individually, direct responsibility for safety in his department, and, with the others, responsibility for safety in the entire plant.

An arrangement was worked out whereby two foremen each month inspected the housekeeping and safety precautions in a third foreman's department. This system has resulted in the quick location of safety hazards; also it has promoted a surprising amount of good fellowship in the give and take between departments. It is surprising how much easier it is to see mistakes in the other fellow's bailiwick.

Of inestimable help in carrying out our program has been the co-operation of our insurance carrier, Employers Mutuals, of Wausau (Wis.). The representatives of this company are experienced in accident prevention; they believe men would rather have pay checks than compensation checks. Don L. Eisenbach, local engineer of Employers Mutuals, makes a thorough inspection of the entire plant once a month and meets with our safety committee.

The entire paper industry of the Northwest is indebted to Mr. Eisenbach for his part in persuading the Duluth

The Blandin mill as seen from the main highway between the Twin Cities and the north. Fountain is illuminated with red and green lights at night



LEFT—Howard Kroll (the author) at his desk in the finishing room. . . . RIGHT—A group of "over 20 years" on the safe side, snapped on their way home from work. Note the "safety first" caps

Chamber of Commerce to add a paper division to its winter safety school program. Today, ten northwest paper companies, including Blandin, participate in sending foremen and selected employees to these paper safety schools which are held in Duluth every month from January through March. A safety plaque will be awarded by Employers Mutuals to the concern having the best safety record among those in this group.

Much credit for the success of our safety meetings and our entire safety program also goes to Ed Whalen, personnel director and to Mrs. Mary Betz, M.T., in charge of the medical department. Mrs. Betz keeps complete accident records for the month, and ways and means are discussed at safety meetings to prevent their recurrence. Recommendations from previous meetings are reread and are checked off as attended to or queried as to progress. New recommendations, as a result of the inspections by the foremen's committees or Mr. Eisenbach's surveys, are brought up for consideration.

At these meetings, everyone unloads his grievances, and we continually try to impress the men with the fact that no foreman of any department—not even my own finishing room—can step from under the major responsibility for an accident. We make the claim that our program is to keep the man from falling off the cliff . . . not to pick him up at the bottom. *It is accident prevention . . . not first aid.*

We have a number of tangible reminders of our safety activities that have been well received. Caps of both the overseas and visor types are provided for the men to wear at work. On them is printed: "Safety First" and "Blandin Paper Company." These caps are sold to employees for the nominal price of ten cents; we feel a man has more appreciation for something he pays for, even though the cost is small.

In every plant department is a large bulletin board that tells the number of days the plant as a whole has gone without a lost-time accident. At the time the pictures used with this article were taken, the record stood at 111 days.

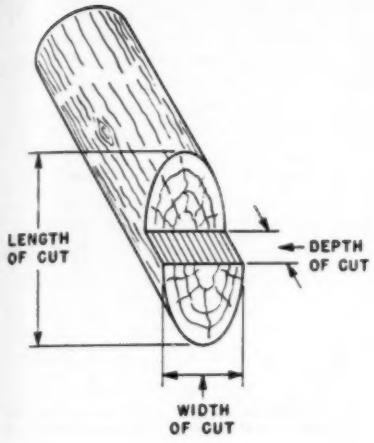
Once a year, awards are made of safety buttons to men who have gone 10, 15, 20 or more years without a lost-time accident. Last fall, approximately 50 men were given handsome billfolds on completion of 20 years without such an accident—not a bad record for a small plant.

(Turn to page 888)

LEFT—Workers raise "Safety First" gate which protects the "nip" on this rewinding reel. . . . RIGHT—Interior view of the Bladin plant which is outstanding for good housekeeping

The Wood Chipper*

H. W. ROGERS, Engineering Consultant
Paper and Textile Division
Industrial Engineering Divisions
General Electric Company



▶▶▶ THE POWER REQUIRED to chip wood has been the subject of considerable discussion, and many requests have been made for a reliable method of calculating the power in order that the correct capacity of motor to meet the operating conditions may be selected readily.

The purpose of this article is (1) to analyze what actually is taking place in chipping wood, and if possible to calculate theoretically the amount of energy required to chip a cubic foot of wood; and (2) to check this analysis against oscillographic records on measured logs with different species of wood.

The wood chipper, used extensively in the paper industry for chipping logs preparatory to chemical treatment, consists of a heavy steel disc, slotted radially for mounting knives, the cutting edges of which project beyond the face of the disc and are adjustable for cutting chips from ½ inch to ⅞ inch length (Figure 1).

The disc, usually motor driven, is mounted on a horizontal shaft and operates in a vertical plane.

The back surfaces of the knives are usually mounted at an angle of 45 deg. with the face of the disc, while the angle of the cutting edge is such as to permit a slight angle of draw, i.e., the angle of the cutting edge may be 3 or 4 degrees less than 45 degrees (Figure 2).

Length of Cut
This depends on the diameter of the log, but is the distance traveled by the knife from the instant it comes in contact with the log until it passes out of the log.

Width of Cut
The width of cut is the distance across the face of the log contacted by the knife. It varies from zero as the knife first comes in contact with the log, to the diameter of the log when the knife is halfway through the cut, and decreases to zero again as the knife leaves the log.

Depth of Cut
The depth of cut is the length of the chip which is measured parallel with the fibers, and since the log is oblique with the face of the chipper disc, the depth of cut is somewhat greater than the distance from the cutting edge of the knife to the face of the disc.

The logs to be chipped are fed into a spout which is mounted at an angle with the disc, thus permitting the logs to slide down the spout against the disc by gravity. However, gravity is not sufficient to keep the log against the disc; once the knife enters the log, it pulls it against the disc. The angle of the spout varies on different makes of chippers from 38 to 52 degrees with the horizontal, and on some chippers the front end is also tilted towards the center of the disc (Figure 3). It is evident that the cutting is done obliquely across grain and that the surface of the log exposed to the disc is eliptical in shape, the maximum width of cut being the diameter of the log, or slightly more, depending on whether the front end of the spout is canted towards the center of the chipper disc (Figure 2). The travel of the knife through the log is considerably greater than the log diameter since the log is cut on the bias.

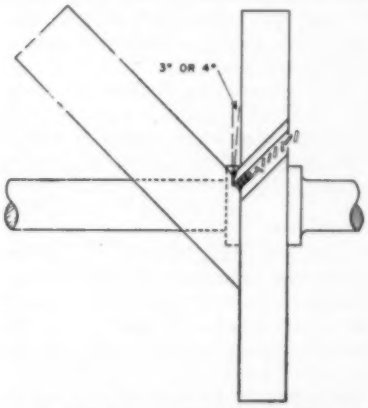


Fig. 2—Sketch of wood chipper showing position of knife in disc and location of spout with reference to the disc

Chippers vary in diameter from 66

(*) This article will be published in two parts. The second installment will appear in an early issue.

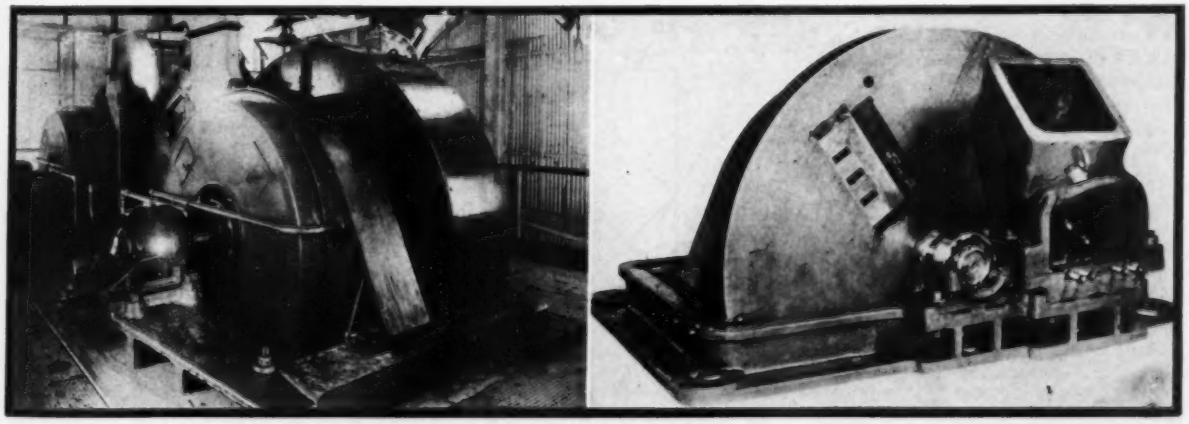


Fig. 1 (left)—Two 96-in. wood chippers each driven by a 300-hp., 0.8 p.f., 277 rpm, 2300-volt, 3-phase, 60-cycle, enclosed, ventilated synchronous motor. . . . Fig. 3 (right)—Four-knife, 88-in. chipper with casing removed, showing position and angle of spout

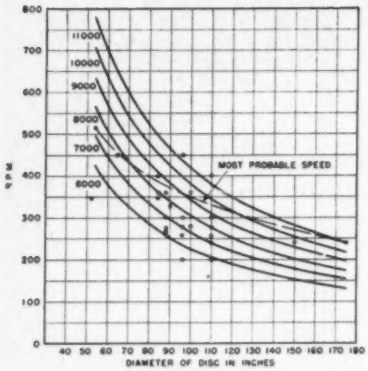


Fig. 4—Chart showing approximate speed at which various diameter chippers normally operate

to 175 inches and may have 4, 6, 8, 10, or 12 knives. The maximum peripheral speed of any disc appears to be about 11,000 fpm, although this varies considerably with the different makes of chipper (Figure 4).

In any event, the capacity of a chipper in cords per hour varies directly with the speed, the number of knives, the length of chip, and the diameter of logs.

Analysis

Practice seems to indicate that the maximum diameter of log for any chipper does not exceed 24 per cent of the disc diameter (Figure 5) and that this maximum diameter is probably one inch less than the spout diameter. It is inconceivable, however, that all of the logs will be of maximum diameter. Nevertheless, the maximum diameter will determine the peak load, and, therefore, the motor rating, while the average diameter of log will determine the production.

The rate at which a chipper will cut wood may be arrived at very simply. For example, a four-knife chipper operating at 100 rpm will make 400 cuts per minute and if it is cutting ¾ inch chips the rate of cutting or feed will be $400 \times .75 = 30$ inches per minute or 5 inches per second. The number of cubic feet cut depends on the length of the logs, the diameter of the log, and the number of logs. In figuring cords it is customary to use 85 cu. ft. of solid wood to the cord.

It would appear that most of the power is used in shearing the wood parallel with the fiber, and that very little is used in actually cutting the fibers across the grain of the wood. This becomes evident if we consider taking very thin shavings off the end of a log, cross grain, with an ordinary carpenter's plane. The area of the sheared surface is practically nil since it corresponds to the thickness of the shaving and the pressure on the knife or plane is likewise extremely small. The chips are continually sheared off by wedge action as the knife proceeds through the log. For instance, as shown in Figure 6, as the pressure builds up on the knife and it enters the log to the point "A," the fibers are compressed to a point where a chip shears off at the line "C" and the pressure is reduced on the knife. As the knife continues to the point "B," the pressure again builds up and compresses the fiber until another chip shears off at the line "D," etc.

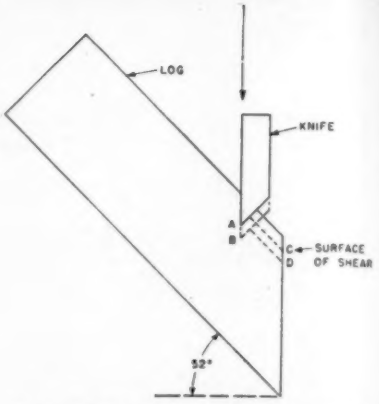


Fig. 6—Position of knife with reference to the log and manner in which chips are sheared off

A graphical analysis of the forces operating in a chipper seems to indicate that the knife pressure is greatest when the spout is horizontal, or parallel with the chipper shaft, at which time there is not only shearing of the wood to overcome but also additional pressure on the wood because of the knife angle, which increases the shearing force. This knife pressure decreases as the angle between the spout and the horizontal increases and at a 45-degree angle the knife no longer causes additional pres-

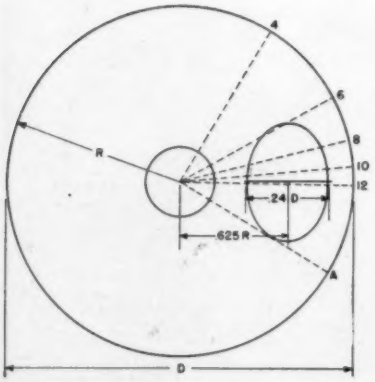


Fig. 5—This sketch shows relationship between maximum log diameter, disc diameter, and location of center of knife on the average chipper

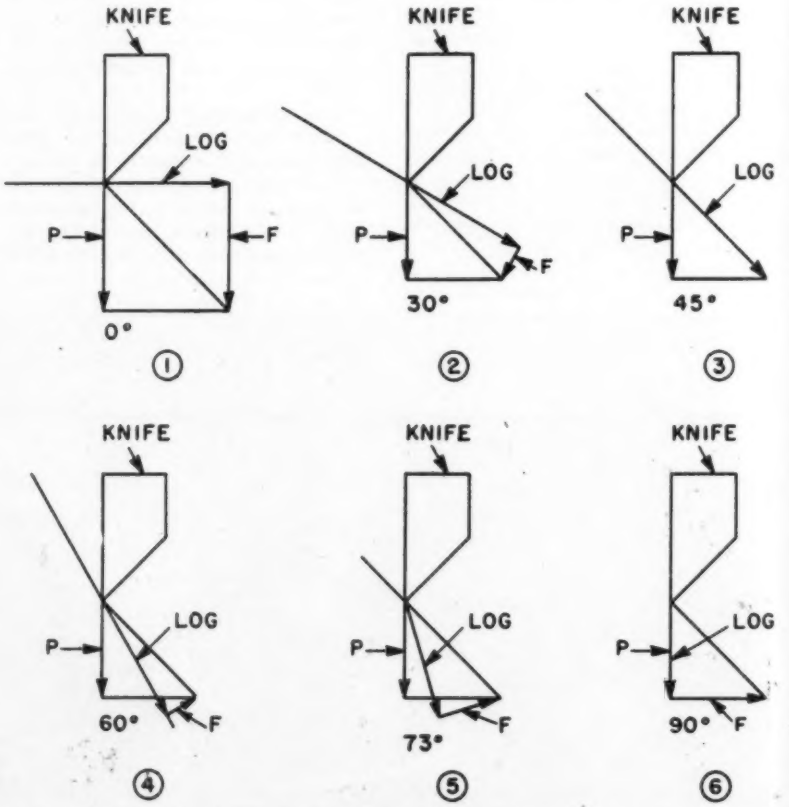


Fig. 7—Diagram showing component forces acting on the log produced by knife pressure P, for various spout angles from 0 deg. with the horizontal to 90 deg. with the horizontal. F is a force acting perpendicular to the fibers and changes direction after passing the 45-deg. spout angle

sure and pure shearing takes place. Beyond the 45-degree angle the knife pressure decreases rapidly because of the splitting action caused by a component force perpendicular to the fiber (Figure 7). At 90-degree angle, the knife pressure is minimum since it is pure splitting. This last condition is, of course, impossible in a chipper and an angle of 52 degrees between the spout and the horizontal is generally used.

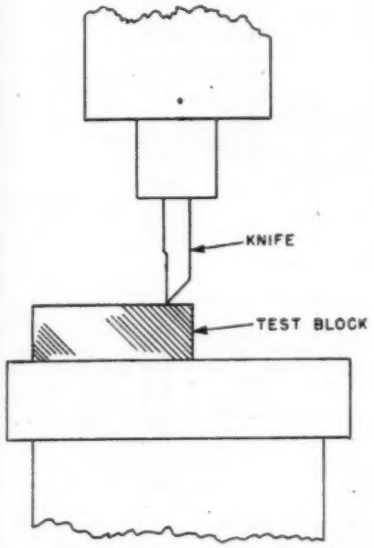


Fig. 8—Set-up of test machine for investigating knife pressure to cause shearing

This angle may have been determined as the most advantageous from theoretical analysis, or it may be the result of practical experience. In any event, it is approximately the angle at which the forces acting on the wood may produce a chip by either shearing or splitting action.

This decreasing knife pressure with an increase in the spout angle is to be expected if we consider that the amount of energy required to chip a cubic foot of wood is fixed, since the surface of the log presented to the disc is elliptical in shape and the long axis of the ellipse increase as the spout angle increases, thereby increasing the distance traveled by the knife in passing through the log. Energy is force acting through distance, and if the distance be increased the force must decrease if the energy is to remain constant.

Laboratory Tests

As a means of checking the analysis, laboratory tests were made, (Figure 8), using sample blocks of both spruce and maple 1⅝ inch × ¾ inch × 6 inch, and since it was not possible to tilt the test blocks at various angles under the knife, the blocks were cut in such a way that the grain of the wood was at 0, 30, 45, and 60 degrees with the length of the block. In this way the effect of a horizontal spout, a 30-degree spout, a 45-degree spout, a 60-degree spout and a 90-degree spout was produced. The knife was made with a 45-degree cutting edge and operated in a vertical direction.

TABLE 1—Shear Values for Wood Parallel with the Grain—20 per cent Moisture

Kind of Wood	Shear
Fir (Balsam)	690
Cedar (Southern White)	730
Cedar (Northern White)	760
Cedar (Western Red)	770
Aspen	800
Pine (Northern White)	800
Pine (Lodge Pole)	820
Cedar (Incense)	820
Cottonwood (Eastern)	870
Fir (White)	890
Basswood	900
Spruce (Eastern)	900
Spruce (Engleman)	910
Redwood (Virgin)	910
Cottonwood (Northern Black)	930
Cypress (Southern)	950
Spruce (Sitka)	950
Cedar (Alaska)	970
Cedar (Port Orford)	970
Douglas Fir (Rocky Mountain)	970
Pine (Sugar)	975
Poplar (Yellow)	980
Alder (Red)	1000
Douglas Fir (Coastal)	1010
Hemlock (Eastern)	1010
Chestnut	1020
Douglas Fir (Inland)	1030
Pine (Ponderosa)	1040
Pine (Norway)	1060
Hemlock (Western)	1060
Butternut	1075
Birch (Paper)	1090
Tamarack	1110
Sugarberry	1160
Pine (Shortleaf)	1180
Larch (Western)	1200
Pine (Loblolly)	1230
Magnolia (Cucumber)	1240
Gub (Black)	1250
Walnut (Black)	1330
Sycamore	1340
Maple (Silver)	1340
Pine (Longleaf)	1350
Ash (Black)	1380
Elm (American)	1380
Hackberry	1420
Magnolia (Evergreen)	1420
Gum (Red)	1460
Cherry (Black)	1480
Elm (Slippery)	1490
Gum (Tupelo)	1490
Ash (Oregon)	1530
Maple (Bigleaf)	1540
Maple (Black)	1590
Maple (Red)	1610
Hickory (Pecan)	1610
Elm (Rock)	1640
Ash (White)	1640
Oak (Red)	1660
Oak (White)	1700
Beech	1725
Birch	1725
Hickory (True)	1870
Maple (Sugar)	2010
Honey Locust	2050
Locust (Black)	2100

The results of these tests are shown in Figure 9 and indicate that the knife pressure for a zero-degree angle of the spout is a combination of shearing and crushing, while at 45 degrees it is plain shear. At 90 degrees it is only that force required to split the wood. The values given on this chart are knife pressure per square inch of area parallel with the fibre.

Test samples were all air-dried wood and the shear values correspond with those given in the U.S. Forest Products Laboratory's Handbook on wood.

If the original assumption that the energy required to chip wood is primarily that required to shear it parallel with the fiber, then there should be a very definite relation between knife pressure and shear value, and having the shear values for various species of wood it should be possible to calculate the power requirements.

Shear Values for Wood

Shear values for most of the American woods given in the U.S. Forest Products Laboratory's Handbook on wood are plotted in Figure 10 and indicate the shear value for both air-dry wood and green wood plotted against the moisture content. In establishing the shear value for 20 per cent moisture content, which is normally used in chipping, it has been assumed that the curve between green wood and dry wood is a straight line.

In this chart the softwoods are to the left and the hardwoods are to the right. Shear values from this table for 20 per cent moisture have been tabulated in Table I for use in calculating power requirements.

The power required to chip wood is a function of knife pressure and the speed at which it travels, and since the center of the knife is approximately 62.5 per cent of the disc radius from the center of rotation it is only necessafy to know the knife pressure.

For example: On a 100-inch diameter chipper operating at 350 rpm, the center of the knife would be 50 × .625 = 31.25 in. or 2.61 feet from the axis of rotation and it would travel at a speed of 2 × 3.1416 × 2.61 × 350 = 5730 fpm.

Since work is force acting through distance, and horsepower is the rate of doing work, the horsepower required is

$$\frac{5730 \times \text{Knife Pressure}}{33{,}000}$$

Effect of Variations in Chipper Designs

Figure 11 shows the cross section of the maximum diameter log exposed to the surface of the disc with a 52-degree angle spout, and also the arc intercepted by the log for various distances of the knife center from the center of rotation, from 50 to 62.5 per cent of the disc radius.

The distance from the center of the knife to the center of rotation may vary on different makes of chippers, but neither the angle intercepted by the log nor the knife travel through the log is affected appreciably.

The length of cut or distance the knife travels in passing through the log is not the long axis of the elliptical cross section of the log, but rather the length of the arc established by the center point of the width of the cut, which varies less than 1 per cent from the arc followed by the center of the knife (Figure 11). And also, whether the distance from the center of the knife blade to the axis of the chipper disc is 50 or 62.5 per cent of the disc radius, the length of cut does not vary more than 2 per cent. Therefore, for practical purposes we may consider the length of cut as the length of the circular arc traversed by the center of the knife blade while passing through the log.

The average width of cut is the area of the log cross section exposed to the disc divided by the distance traveled by the knife.

To illustrate, consider the following data Table 2 which applies to a 54-inch chipper in which the distance from the center of the knife to the axis of rotation is taken as 62.5 to 50 per cent of the disc radius.

The radius to the knife center in inches is given in column (2), and the feet travel per revolution of the knife center as shown in column (3) is calculated from the formula F.P.R. =

$$\frac{2 \pi R}{12}$$

The angle (ϕ), column (4) is the number of degrees traversed by the knife in passing through the log and is derived graphically as shown in Figure 11.

The travel of the knife through the log, column (5) is derived from column (3) and (4) thus:

$$\text{Travel in feet} = \frac{\text{Feet per Rev.} \times \text{Angle (degrees)}}{360 \text{ (degrees)}}$$

Since the travel of the knife through the log is practically constant and the knife pressure required to chip the wood remains unchanged, the energy

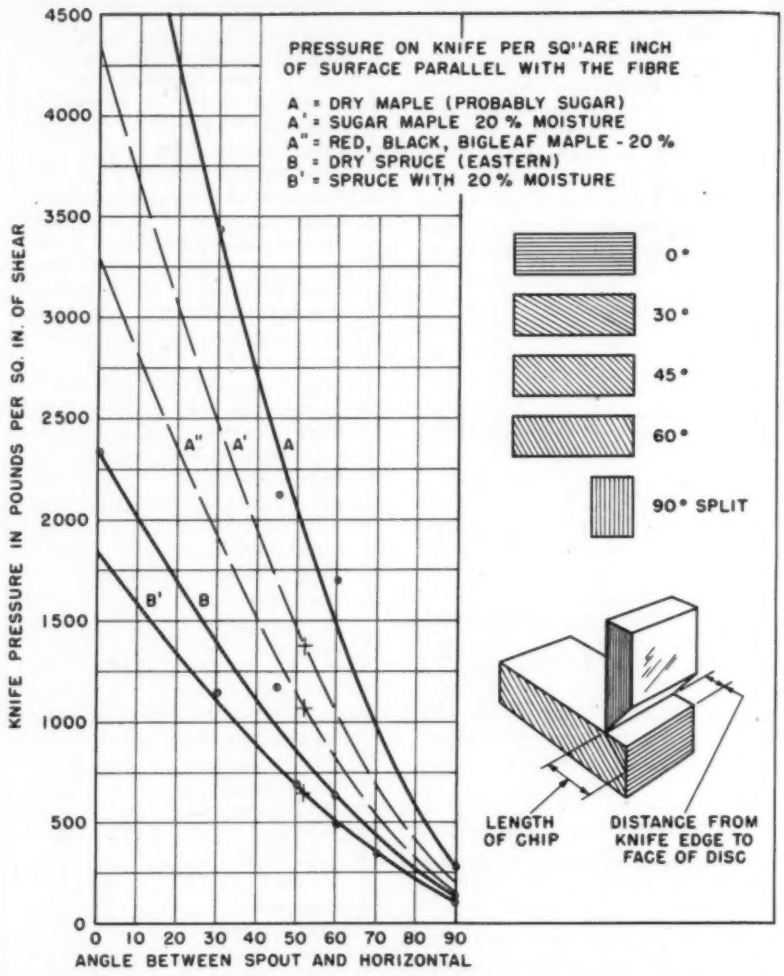


Fig. 9—Chart shows result of laboratory tests and manner in which test blocks were prepared with reference to the grain of the wood

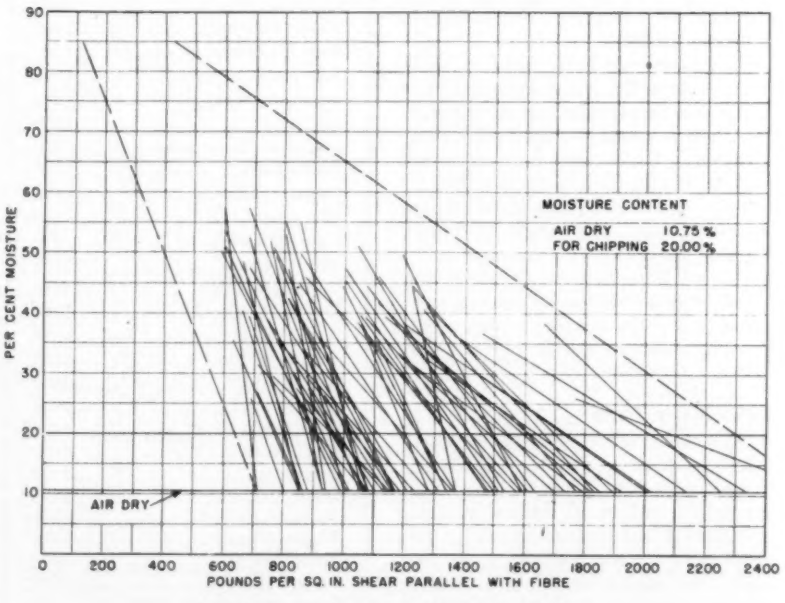


Fig. 10—Shear values for wood parallel with fiber

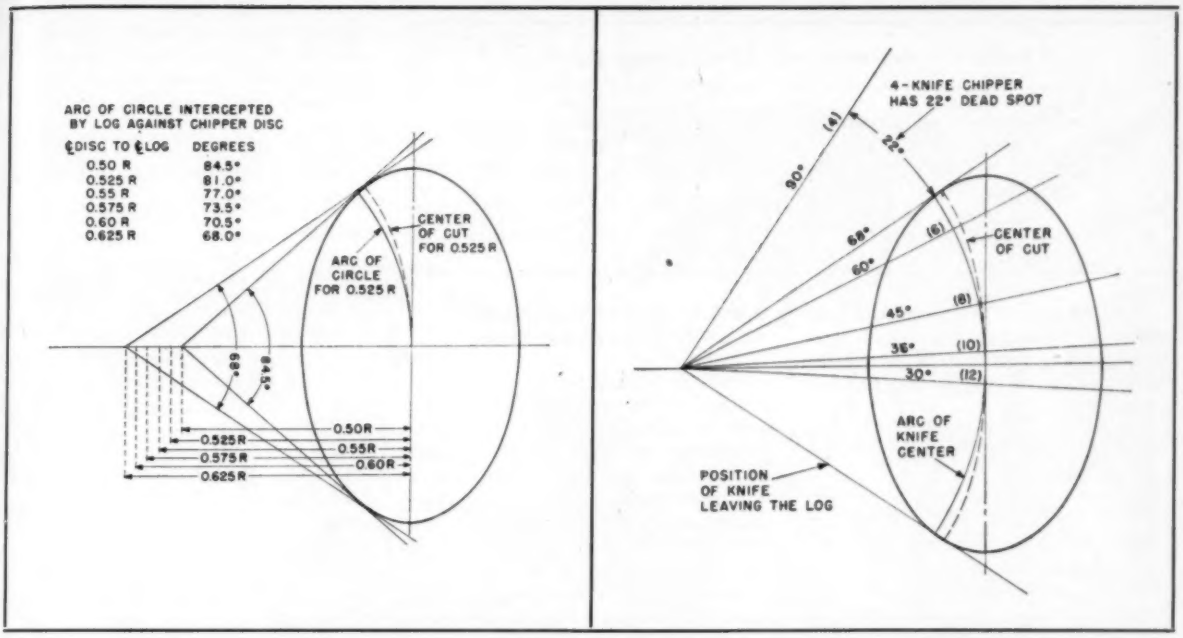


Fig. 11 (left)—Sketch showing arc of circle intercepted by cross section of maximum diameter log with spout angle 52 deg. with the horizontal and center of log at 50 to 62.5 per cent of chipper disc radius from center of disc. . . . Fig. 12 (right)—This sketch shows the overlapping of knives in the 6, 8, 10 and 12 knife chippor, also the extremely small difference in length of cut between the arc of the knife center and the center of the cut

consumed during the one revolution remains the same. Therefore, the product of the angle (ϕ), column (4) and the radius, column (2) should be constant as shown in column (7). In other words, the horsepower will be the same since torque is directly proportional to the radius, column (2).

Effect of Number of Knives on Load

Mention already has been made of the number of knives used in modern chippers, and Figure 12 shows the position of the knives with reference to the log sections when one knife is just finishing a cut.

Since the angle intercepted by the maximum diameter log is 68 degrees, there is an idle space of 22 degrees on the four-knife chipper when no knife is in the cut, but on the six-, eight-, ten-, and twelve-knife chippers there are always two, or even three, knives in the log which increases the average width of cut when this condition exists.

In Figure 13, the duty cycle for four,- six,- eight-, ten-, and twelve-knife chippers is illustrated, the curves being plotted between angle of rotation and average witdh of cut. The area beneath each of these cycle curves is the same because one-half of the area resulting from the overlapping knives is subtracted from each end of the cycle and added above to increase the width of cut, the average width of cut increasing in direct proportion to the number of knives, as would be expected, since the power required is a direct function of the number of knives. The one thing to keep in mind here is the factor giving the average width of cut in terms of log diameter.

Theoretical Calculation of Power

As an example, let us consider that we have a 12-inch diameter log to chip and that the spout angle is 52 degrees. The surface exposed to the disc is an ellipse with the long axis 1.625 times the diameter or 19.5 inches. However, as shown in Figure 11, the knife travel follows the radial arc at the center of the log diameter, within less than one per cent deviation rather than the long axis of the ellipse and is, therefore, only 1.545 times the diameter of the log.

The area of cross section of a 12-inch log is 113.1 square inches and the length for one cubic foot is $\frac{1728}{113.1}$ = 15.28-in. If ¼-in. chips are being cut, the number of cuts per cubic foot will be 15.28 divided by 0.75, or 20.4 cuts, and the square inches of shear for log diameter will be 12 times 0.75, or 9. square inches.

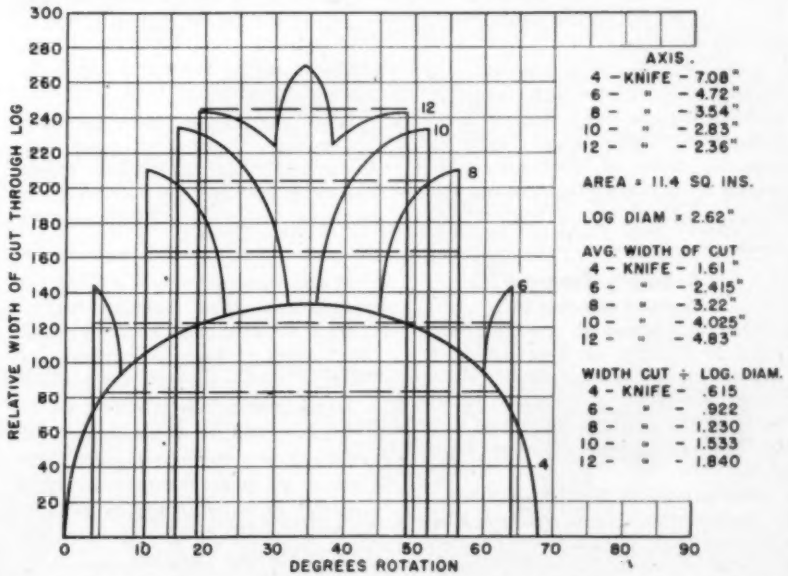


Fig. 13—Chart showing repetitive load cycles for 4, 6, 8, 10 and 12 knife chippers and relative width of cut in terms of log diameter

TABLE 2—(Data Based on a 12-in. diameter Log)

(1) Knife (per cent)	(2) Rad. Knife (inches)	(3) Ft./Rev.	(4) Angleϕ (deg.)	Travel (5) through log (ft.)	Avg. (6) length Cut (ft.)	(7) Rad. X Angle
62.5	16.87	8.83	68	1.67	.86	1147
60	16.2	8.48	70.5	1.66	.86	1142
57.5	15.53	8.14	73.5	1.66	.86	1142
55	14.85	7.77	77	1.665	.861	1145
52.5	14.17	7.43	81	1.67	.86	1147
50	13.5	7.06	84.5	1.66	.86	1143

The total travel of any one knife in cutting one cubic foot of wood is a function of the number of knives or the angle between knives and may be expressed as:

$$\frac{\text{Angle deg. X Number Cuts per cu. ft. X 1.545 X dia. Log}}{\text{68 deg. X 12}}$$

For a 12-in. diameter log this is:
41.7 ft. for a 4-knife chipper
27.8 ft. for a 6-knife chipper
20.85 ft. for an 8-knife chipper
16.7 ft. for a 10-knife chipper
13.9 ft. for a 12-knife chipper

The foot pounds per cu. ft. of wood is equal to the average knife pressure times the distance traveled. The knife pressure psi of shear for spruce with 20 per cent moisture content and a 52-degree spout is 650 pounds (Figure 9), which gives a total knife pressure of 650 times 9, or 5850 pounds for the full diameter of the log.

However, this value must be multiplied by the factor in Figure 13 to obtain the average knife pressure in terms of log diameter and then multiplied by the distance through which the knife moves, resulting in the following:

4-Knife Chipper =
5850 X .615 X 41.7 = 150,000 ft. lb.
6-Knife Chipper =
5850 X .922 X 27.8 = 150,000 ft. lb.
8-Knife Chipper =
5850 X 1.23 X 20.85 = 150,000 ft. lb.
10-Knife Chipper =
5850 X 1.533 X 16.7 = 150,000 ft. lb.
12-Knife Chipper =
5850 X 1.84 X 13.9 = 149,700 ft. lb.

As is to be expected, the foot pounds per cu. ft. of wood is the same, regardless of the number of knives. This value of 150,000 foot pounds converted to horsepower seconds is 273, which corresponds favorably with the oscillographic test of 283 horsepower seconds.

Following the same procedure, the horsepower seconds per cubic foot of maple is 446 as against the oscillograph test of 465.

Safety by Rule*

▶▶▶ SAFETY RULES are a "must" for any type of industrial operation.

Such regulations grow up with the development of every craft, and their promulgation is the responsibility of the master craftsman who is charged with the training of each apprentice. In this system, the safety rules become a tradition, passed on by word of mouth.

But as an industrial organization grows, accurate presentation of safety rules to the far-flung personnel becomes a different problem—and the rules must be reduced to written form as safety rule books.

Safety rule books in common use throughout the United States and Canada range from brief mimeographed leaflets to leather-bound loose-leaf manuals. Some of them are deadly serious in context, and many are written in a lighter vein, often profusely illustrated with cartoons. Some offer a combination with straight presentation of text enlivened by humorous drawings.

Only the good judgment of the committee preparing the rule book and that of the foreman and key workers called upon for review can determine whether a specific operation should be the subject of a hard and fast rule or should be governed by recommendation and suggestion.

In addition to review of a proposed set of rules by selected groups, most companies find it advantageous to post the final draft on the bulletin board for review by the entire personnel, with a notice stating the purpose and proposed date of adoption and asking for criticism and comment.

When the adopted rules are ready for publication, the final production may appear in any one of many forms. The most common type is a pocket-size handbook with a heavy paper cover, although some are more elaborate with cloth or plastic covers.

When the rules are published the first time, the foreman usually makes the presentation to each employee in his department . . .

Enforcement procedures vary as widely as industry itself. If rules are to mean anything, provision must be made for applying and enforcing them. In this respect, education seems to be the most satisfactory approach. With patience and perseverance, supervisors will not have to resort to threats, layoffs or discipline slips.

When discipline is necessary, after strong warnings have failed, repeated violations may necessitate layoffs or final discharge. In such cases, the aid of the union should be asked before final steps are taken, as this will do much to prevent future misunderstanding.

We have seen the value of accident prevention rules as they have been developed, and their unification through printed booklets has become a necessary step—but the executive charged with the responsibility for the company's safety effort should remember that rule books provide only a starting point.

We have seen the value of accident prevention rules as they have been developed, and their unification through printed booklets has become a necessary step—but the executive charged with the responsibility for the company's safety effort should remember that rule books provide only a starting point.

(*) Adapted from article published in *National Safety News*, July, 1948.

A Safety Program

(Continued from page 882)

Our successive steps toward a safer plant at Blandin are due largely to the attitude of our management toward safety. No safety program ever is better than the management wants it to be. The management never has let us down.

Machinery has been modernized.

Methods have been changed when desirable from the standpoint of safety.

Labor-saving machinery has been installed, such as trucks and hoists to avoid strains and heavy lifting.

Management not only is willing, but anxious, to share anything learned through our own experience with other companies; visiting delegations are willingly shown through the plant.

Safety glasses are provided on all jobs where they are absolutely essential and employees are encouraged to wear them at all times. Eye tests are given free and prescription glasses are supplied at one-third of cost. Over 80 per cent of the employees now wear safety shoes at all times. These are purchased from the company at cost.

Paper SKETCHES . . . . . .

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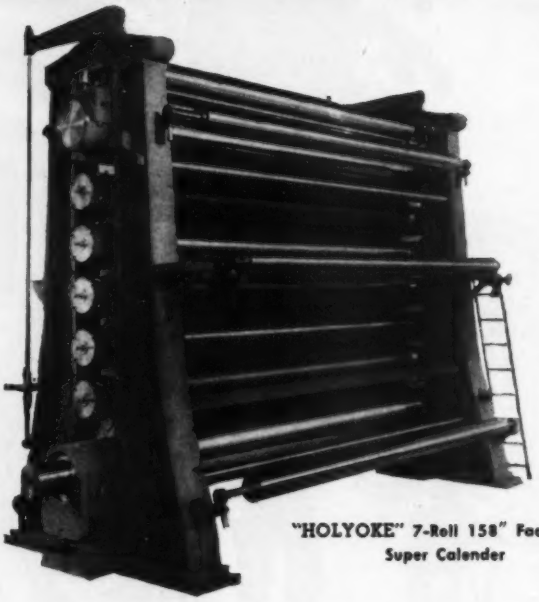

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Plastic Committee Sponsors First TAPPI Fall Meeting

Reported by
DR. T. A. HOWELLS

▶▶▶ THE FIRST OF a series of six TAPPI meetings scheduled for this fall was held August 16 and 17 at The Institute of Paper Chemistry in Appleton, Wisconsin. Under the sponsorship of the Plastics Committee of TAPPI, this meeting attracted over 200 representatives of paper manufacturers, resin suppliers, paper converters, research and educational organizations, and others interested in the use of plastics and paper. Among those present were Dr. W. G. Campbell, of The Forest Products Research Laboratory in England, and Jean Istas, of the Ministry of Colonies of Belgium.

Dr. E. C. Jahn, of New York State College of Forestry, opened the meeting as chairman of the Plastics Committee. R. G. Macdonald, secretary-treasurer of TAPPI, welcomed the visitors on behalf of the national organization and traced the history of the trend from the former large fall meetings to the smaller meetings dealing with more specialized fields.

The first day of the conference was devoted to a Symposium on Resins to Fiber Bond under the chairmanship of Dr. Herman Mark, of the Polytechnic Institute of Brooklyn. In his opening remarks, Dr. Mark pointed out that the type of bonding under discussion involved nonchemical interaction of one large molecule with another. When both molecules are small, the effects of such interaction may appear as solubility, miscibility, or compatibility. If one molecule is large and one small, the effect may be swelling. If both are large, the corresponding effect may be one of adhesion. When two materials are mixed, two thermodynamic effects result; one being the heat of swelling, mixing, or solution, and the other being an entropy effect concerned with the geometrical arrangement of the molecule. In the larger molecule, the latter effect becomes of relatively greater importance.

Dr. Mark then introduced R. C. Hasselbart, of the Plaskon Division of Libby-Owens-Ford Company, who talked on "Aminoplastics." Mr. Hasselbart pointed out the fact that the ureaformaldehyde resins alone are very brittle. Cellulose is the only material found to contribute the toughness required for most applications. Hydrogen bonding between resins and fiber appears to be a logical explanation of this combination.

R. L. Steller, of the B. F. Goodrich Chemical Company then discussed the "Adhesion of Vinyl Polymers and Acrylonitrile-Butadiene Copolymers to Cellulose," and presented data comparing the effect on paper of the addition of various elastomeric materials. In his paper on the "Technical Aspects of the Adhesion of Phenolic Resins to Cellulose," C. J. Straka, of Westinghouse Electric Corporation, reviewed the various methods for measuring the bonding strength of phenolic laminates. These include the measurement of the force required to split a laminate by pressing a steel ball of standard diameter against the edge, the method involving the force required to separate a laminate by tension applied perpendicular to the lamination through steel blocks bonded to the surfaces, and a method developed in the Westinghouse Laboratory. The latter uses a cellophane sheet inserted in the laminate. Holes are provided in the cellophane in order to permit the bonding in small, confined areas, and the force required to separate the laminate in shear is measured.

Dr. Mark then summarized the fundamental aspects of adhesion of resins to fibers and discussed the various types of bonding. These include simple mechanical entanglements (involving only frictional forces), polar adhesion (involving the presence of dipoles), hydrogen bonding (involving the sharing of a "confused hydrogen atom" by two other groups), and chemical or covalent bonding. These types of bonding differ in the strength of the bond after it is established and in the minimum separation of the grouping involved necessary before these forces can come into being. In order for polar bonding to become effective, the groups involved must approach each other within a distance of 4 to 5 Angstroms. For hydrogen bonding this spacing must be not over 2½ to 3 and for chemical bonding the spacing must be in the range of 1½ to 2. The strength of the bond formed in mechanical entanglement is very low. That of the polar bonding will run about two to four thousand calories per mole; that of the hydrogen bonding about five to eight thousand calories per mole, and that of the chemical bonding about fifty thousand calories per mole.

In considering the factors involved in obtaining good adhesion it is found that quite often a compromise is necessary. If the molecules involved are too large or of poor shape it will be difficult for them to get sufficiently close together to establish good bonding. On the other hand, if the molecules of the resins are too small it will be difficult for them to bridge the distance between the different fibers, and if such bridges are made, stresses and brittleness may result. If the resin has too few reactive groups, there will not be a sufficient number of bonds established to contribute good strength. On the other hand if the resin molecule has too many reactive groups these reactive groups may tend to react with themselves.

The second day of the conference was devoted to a Panel Discussion on "Plastics in Paper Converting." This part of the program was sponsored by the Subcommittee on Plastics in Paper Converting, under the chairmanship of R. H. Mosher, of the Marvellum Company. In the absence of Mr. Mosher, the morning discussion was led by J. C. Pullman of the American Cyanamid Company and the afternoon discussion by R. H. Barkhuff of Monsanto Chemical Comany. In his opening remarks, Mr. Pullman noted the increasing use of resins in connection with paper for many applications and the increasing emphasis being placed by the resin suppliers on the development of resins for paper uses.

In the first paper, Arthur Gaio, of John Waldron Corporation, discussed "Machinery for the Application of Plastic Coatings," and reviewed the various types of machinery available for this purpose. These were divided into knife, air, brush, roll, and cast types of coaters; and various modifications of each were discussed.

In the second paper of the group, Creed Grumbles of Shellmar Products Corporation discussed "Solvent Coatings" and reviewed the limitations, advantages, and some of the types of materials made by this process. Among the limitations of solvent coating were mentioned the cost of solvent, toxicity, flammability, and odor retention. Among the advantages are the versatility of formulation, the use of less heat for drying of solvent as compared

with water, and the fact that paper is weakened to a lesser extent by solvents than by water. Mr. Grumbles also mentioned the increasing use of solvent recovery systems, most of which are based on the use of Columbian Activated Carbon.

In the third paper, Paul Yoder, of Pyroxylin Products, Incorporated, discussed hot melt coatings. These coatings are comparatively new and require no solvent or drying. They are restricted to thermally stable materials and are limited by the machinery available. Among the factors discussed were the smoothing of coatings, pre-heating of the web to improve anchorage and fast chilling to improve the gloss.

In the afternoon session, E. B. Osborne, of the B. F. Goodrich Chemical Company, discussed the new types of materials available as water dispersions. This type of application has the advantage of eliminating the use of expensive inflammable solvents but has other limitations in the type of materials which may be used.

The newest development in the application of vinyl materials is the use of organosol and plastisol coatings. These were discussed by John Rich of the Plastic Film Corporation. Plastisols may be prepared simply by stirring finally divided resins into the proper type of plasticizers. These are not usually applied to paper because of the high fusing temperatures required. Organosols are prepared by dispersing resin particles in a mixture of plasticizer and a material which is a poor solvent for the resin. The choice of the components of the system is very important in order to obtain materials which will disoslve the resins at high temperatures but not at low temperatures. In the process of milling the viscosity first increases because of agglomeration of resin particles, and is then followed by a decrease as the resin particles are dispersed and then an increase of viscosity because of solvation of the resin particles. The organosols are prepared by milling to the point of minimum viscosity; drying conditions are also very critical.

In the final paper of the Panel Discussion, J. C. Pullman, of the American Cyanamid Corporation, reviewed "New Developments in Coating Resins," and briefly discussed the various types of resin materials available for these applications.

On the evening of August 16, a buffet supper was served at Bute des Morts Golf Club sponsored by the Lake States Section of TAPPI. Over 180 of the delegates attended. No formal program or entertainment was included, but instead an opportunity was provided for the various persons attending the meeting to gather together for informal discussion.

TAPPI Meeting on Fundamental Research

Reported by LOUIS E. WISE and MERLE HEATH

▶▶▶ CHOOSING as its theme "The physical properties of the components of wood," the Technical Association of the Pulp and Paper Industry held the fall meeting sponsored by its Fundamental Research Committee at the Forest Products Laboratory, Madison, Wisconsin, August 18-20. This was the second of six meetings covering various phases of TAPPI activities which are to be held this fall.

Excellent room and board were provided at Kronshage Hall and its adjoining dormitories on the campus of the University of Wisconsin. The committee on arrangements, Dr. Alfred J. Stamm, the general chairman, Dr. George Ritter, and other members of the F. P. Laboratory Staff deserve the highest praise for the effectiveness with which the entire meeting was handled. The dorms were delightfully situated overlooking Lake Mendota, which, for the benefit of early arrivals, mirrored a sharp (and much needed) thunderstorm on the evening of August 17. The weather for the remainder of the three-day meeting was perfect.

The registration, which began early the next morning, showed the widespread interest of technical men from the pulp and paper and allied industries everywhere in the progress of fundamental research. Registrants from foreign countries included: Prof. Holger Erdtman, of the Royal Institute of Technology, Stockholm; his wife, Dr. Gunhild Aulin-Erdtman, of the Swedish Forest Products Laboratory; Dr. W. G. Campbell, of the Forest Products Research Laboratory, at Princes Risborough, England Jean Istas, of the Research Laboratories of the Ministry of Colonies, Belgium; and J. C. Aggarwala, Government of India student. Dr. W. Boyd Campbell, of the Pulp and Paper Research Institute, was among the group of seven attending from Canada. Other registrants represented manufacturers from Maine to California and from Minnesota to Louisiana, as well as federal, state, and private research organizations. TAPPI was officially represented in the presence of R. G. Macdonald, the genial secretary. The final registration list contained 150 names.

Dean Harry F. Lewis, chairman of the Fundamental Research Committee, maintaining that the meetings of that committee always start on time, opened the first session promptly at 9:00 A.M. on Wednesday, August 18. After a brief review of the previous annual fall meetings, George M. Hunt, director of the Forest Products Laboratory, was introduced, and extended greetings on behalf of the host organization.

The program was arranged as three morning and three afternoon sessions with one fundamental phase of the physical chemistry of the components of wood being covered in each session. The procedure used was to begin with a review of the subject by an authority in that particular field, this presentation being followed by an open discussion under the direction of a separate discussion leader. The plan worked very well and served to stimulate an exchange of ideas, and to bring out suggestions and pertinent experiences, as well as to illuminate anomalous or unexplored aspects of the subject and to stress the need for better experimental methods or research tools along certain lines.

The complete program of the technical sessions was as follows:

Wednesday Morning

Topic No. 1—"Microstructure of Wood and Wood Components

Reviewer: Dr. George J. Ritter, Forest Products Laboratory.

Discussion Leader: Dr. Thomas Kerr, North Carolina Agriculture Experiment Station.

Wednesday Afternoon

Topic No. 2—"Submicroscopic Structure of Wood and Cellulose"

Reviewer: Prof. H. Mark, Department of Chemistry, Polytechnic Institute of Brooklyn.

Discussion Leader: Dr. W. A. Sisson, American Viscose Company.

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Thursday Morning

Topic No. 3—"Wood and Fiber-Liquid Relationships"

Reviewer: Dr. W. Boyd Campbell, Pulp and Paper Research Institute, Canada.

Discussion Leader: Dr. L. V. Forman, The Institute of Paper Chemistry.

Thursday Afternoon

Topic No. 4—"Passage of Materials through Wood, Paper, and Fabrics"

Reviewer: Dr. Alfred J. Stamm, Forest Products Laboratory.

Discussion Leader: Dr. Wm. H. Aiken, The Goodyear Tire & Rubber Company.

Friday Morning

Topic No. 5—"Physical Properties of Lignin"

Reviewers: Dr. F. E. Brauns, The Institute of Paper Chemistry; Dr. Gunhild Aulin-Erdtman, Swedish Forest Products Laboratory; E. J. Jones, Jr., The Institute of Paper Chemistry.

Discussion Leader: Dean Harry F. Lewis, The Institute of Paper Chemistry.

Friday Afternoon

Topic No. 6—"Shrinkage and Swelling of Wood, Paper Products, and Textile Fibers, and their Control"

Reviewer: Dr. Harold Tarkow, Forest Products Laboratory.

Discussion Leader: Dr. J. A. Van den Akker, The Institute of Paper Chemistry.

In the first session, Dr. Ritter reviewed (1) the microscopic methods used for the examination of wood sections, (2) information that has been obtained on the distribution of cellulose, lignin, ash, and extractives throughout the cell structure, (4) the breakdown of fibers into fibrillae and fibrillae into small fusiform units, and swelling experiments in the wood and fiber structure, including the development of retardation colors in photomicrographs by the use of polarized light. Dr. Ritter stressed the importance in all his work of maintaining the material at saturation moisture content throughout so as to avoid changes in the structure by drying.

In the second session, Professor Mark outlined the available physical methods for studying the submicroscopic or fine structure of cellulose. These methods have been applied to estimate the relative proportions of crystalline and amorphous regions. The recent work of P. H. Hermans in refining the experimental X-ray technique was cited. The physical methods agree fairly well, but are not in agreement with the chemical methods, initiated by Nickerson, since these indicate much higher crystallinity values. To reconcile this discrepancy it has been postulated that the crystallinity may increase during and as a consequence of the chemical attack, and Professor Mark submitted some very recent evidence supporting this theory obtained by Dr. Frilette in his laboratory in which the physical methods were applied to samples previously hydrolyzed by the chemical method, and a definite increase in crystallinity was shown. Hermans has obtained similar results by hot water treatments of very amorphous celluloses, and the heat of crystallinity has been measured by him at 5500 calories per glucose unit. Additional work along this line is in progress.

Following Professor Mark's presentation, Dr. B. M. Siegel of the Polytechnic Institute of Brooklyn showed a number of recent electron micrographs of cellulosic samples representing the fine sub-fibrillar structure of the primary and secondary cell wall. Dr. W. A. Sisson of American Viscose Company also showed an electron micrograph of fibers disintegrated by ultrasonic waves to give small spindle shaped particles.

A banquet was served Wednesday evening at Kronshage Hall. The foreign guests were introduced and Prof. Erdtman spoke in somewhat unfavorable terms of the nocturnal noises produced by American crickets. The principal after dinner entertainment was musical and featured an excellent barbershop quartet. Appropriately, the leader of the quartet was a member of the staff of the Forest Products Laboratory.

On the second morning a number of visitors turned out for a guided tour through the Forest Products Laboratory, even though it meant starting at 7:30 A.M.

In the third session, the first of the second day, Dr. W. Boyd Campbell emphasized in his review the importance of the surfaces of cellulose fibers, both external and internal. In considering the external surface it was brought out that there was a need for new and more accurate methods, first, for measuring the total surface area, and, second, for obtaining an index of the fiber shape. The present available methods were reviewed and discussed and the recent experiments of A. A. Robertson working with Dr. S. G. Mason at the Canadian Pulp and Paper Research Institute were quoted. The correlation of specific volume to freeness tests and ultimate tensile strength of the paper was also discussed.

In considering the internal surface of cellulosic materials Dr. Campbell brought up a number of speculations for discussion, and stressed the part that internal tension must play in cellulose-water relationships. A lively discussion under the leadership of Dr. L. V. Forman followed.

In the afternoon session Dr. Alfred J. Stamm presented equations which have been developed from the fundamental Poiseuille relationship for capillary tubes, to measure the passage of materials, particularly liquids, through wood, paper, and fabrics. He then described experimental procedures applied to arrive at the radius and length of the capillary openings, or their equivalents, so that the equations may be used. The practical importance of the passage of water and water vapor through pulp was brought out in the discussion.

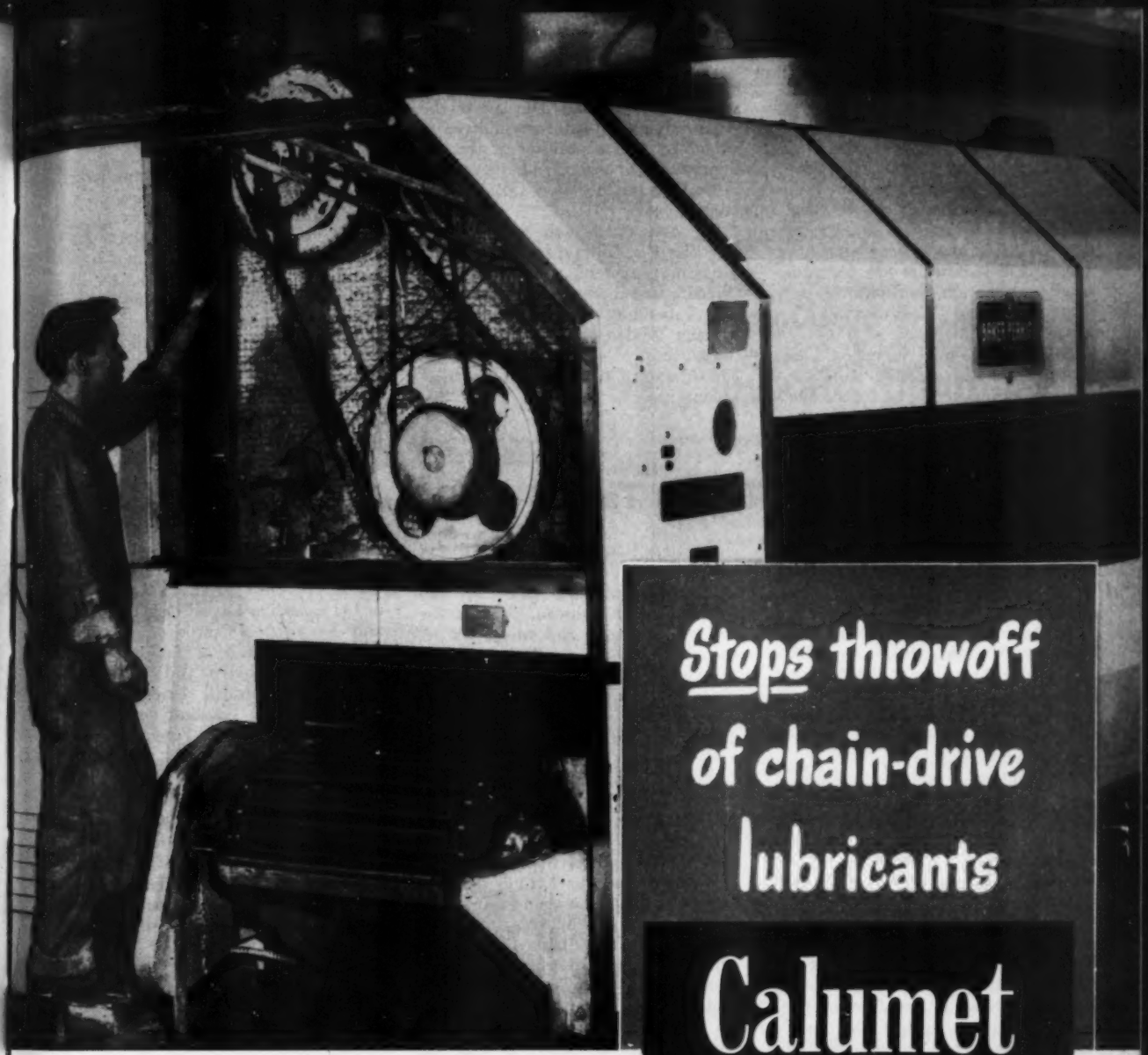
On the second evening nearly 80 of those attending the meeting, and their wives, enjoyed an hour-long boat trip around Lake Mendota which borders the campus of the University of Wisconsin as well as a considerable portion of the city of Madison.

On the final day the first session featured reviews by three speakers on different phases of the physico-chemical products of lignin. Dr. F. E. Brauns first presented the subject with particular attention to the basic unit and measurements of the average particle size. Dr. Gunhild Aulin-Erdtman then gave a very lucid report on her investigations of the ultraviolet spectroscopy of lignin. In a different range of the electro-magnetic wave system, Mr. E. J. Jones, Jr. described the study which he has initiated on the infrared spectroscopy of lignin and related materials, as a graduate student at The Institute of Paper Chemistry.

In the subsequent discussion Prof. Holger Erdtman described the status of work on the molecular size of lignin, the differences in reactivity of its chemically active groups, and some of the results of his investigations of low sulfonated lignin sulfonic acids.

For particle size determinations it was pointed out that lignin seems to be in a range just beyond the scope of the classical methods, but is not large enough for effective use of the ultracentrifuge or other high polymer methods. Isothermal distillation has possibilities, but more data are needed.

In the afternoon session, Dr. Harold Tarkow discussed shrinking and swelling, or the hygroexpansivity, of wood and fibers. The part played by the outer and inner windings of the fiber was pointed out. Data were submitted in support of the conception that dimensional stability, or resistance to shrinking, was obtained by the inclusion of a certain proportion of inert material (about 30%) in wood. When this was



Stops throwoff of chain-drive lubricants

Calumet Viscous Lubricants

A Midwest food processor faced the problem of discontinuing all lubrication of mixer and oven drives. No lubricant that was tried would stay on the gears and chains. The possibility of product contamination was a continual hazard.

On the other hand, the maintenance engineer realized that excessive wear and noisy operation would result if these drives were run dry. It appeared that some special-purpose lubricant was needed. He put the problem up to a Standard Oil Lubrication Engineer.

The engineer's solution was simple. No costly special-purpose lubricant was required. He recommended Calumet Viscous Lubricant 5-X—a product which was designed to stay on drives under high temperatures. This lubricant eliminated throwoff, even on the top oven chains, which had been particularly difficult to lubricate.

Before you resort to extreme measures for solving any lubricating problem, call a Standard Oil Lubrication Engineer. You'll find that his help offers a simple, effective solution to practically any lubricating problem, and he has a complete line of industrial lubricants. If your plant is located in the Middle West, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the engineer nearest you.

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accomplished by ester formation, the same volume of a higher molecular weight material, such as the butyryl groups, was an effective as the lower molecular weight acetyl group, even though it did not replace as many cellulosic hydroxyl groups.

Cross-linkages formed by treating wood with formaldehyde vapor give dimensional stability at low formaldehyde consumption, but unfortunately the experimental conditions also severely degrade the wood.

Following the final discussion, Dean Lewis closed the meeting and asked those attending to take under consideration the question of what form future meetings should take. The last of the series originally planned will have as its subject the mechanism of the delignification of wood, and is expected to be held on the West Coast in the fall of 1949.

In conjunction with the technical meetings the ladies participated in a program of entertainment which included a tour through the Forest Products Laboratory on Wednesday, the banquet Wednesday evening, a tea at the home of Mrs. Alfred J. Stamm on Thursday, and the boat trip Thursday evening.

The "Lignin Round Table"

▶▶▶ A NOVEL AND interesting meeting was held at The Institute of Paper Chemistry, at Appleton, Wisconsin, on August 12-14th, when chemists, engineers, teachers, and technologists joined forces to hold a round-table discussion on the chemistry and utilization of lignin, which (as the reader well knows) is one of the greatest and most challenging organic waste products in the world today.

Many of the visitors were eminent men, and one at least, was a very brilliant and unusual woman. The meeting should serve to catalyze lignin research, not only in the U. S. A. but in Canada, England, and the Scandinavian countries as well.

As industrial representatives, government scientists, and college professors began to flock to the Institute on Wednesday, August 14, some of us wondered how, in the face of their ever-increasing numbers, we could hope to have a real "round-table" discussion. This was especially true because the participants were asked to speak informally, and inasmuch as no stenographic or wire records were to be kept. However, in our skepticism we had reckoned without the verve and resourcefulness of Dean Harry F. Lewis, prime-mover and general chairman of the meeting. It was he who kept the conference on even keel, and who injected humor and enthusiasm into its various sessions. Whenever catalysis was needed, Harry Lewis was on the job.

In the early session on Thursday, August 12th, the auditors in the back row had a little difficulty in following discussions. That was soon remedied by the installation of loud speakers.

Soon after the meeting opened a distinguished visitor, Dr. Holger Erdtman, Professor of Organic Chemistry at the Royal Institute of Technology in Stockholm gave his views on what constituted lignin in wood. He was ably seconded by Dr. F. E. Brauns of The Institute of Paper Chemistry and by Mrs. Aulin-Erdtman, wife of the Swedish professor, and one of the research associates of Professor Erik Hägglund of the Swedish Wood Institute in Stockholm. Dr. Erdtman's keen wit and his extensive knowledge of lignin chemistry impressed the audience. They all succumbed to Mrs. Erdtman's erudition and personal charm. As usual, Dr. Brauns was in his element, and ably led a number of discussions on the nature, properties, and configuration of lignin.

Gathered in the lecture room in which was held the round table were at least 35 representatives from pulp and paper mills. About 14 scientists represented government laboratories (both within and without the United States), and the universities sent some 18 college profressors. The Institute staff was well represented as well, and some of the graduate students took part in the discussions.

The first day was devoted to attempts in delimiting the term "lignin." Often definitions were elusive and subject to debate. Dr. Erdtman based his criteria on the property of lignin which permits its sulfonation (with the loss of hydroxyl groups). Others held different views. In the afternoon, Mr. Edward J. Jones, Jr., (of the Institute) gave a comprehensive and interesting review of his work on the infrared spectrum of lignin [cf *J. Am. Chem. Soc.* 70, 1984 (1948)].

In the evening many of the guests of the Institute were entertained at Kubsch's Tavern at Kellnersville, Wisconsin.

The second day of the conference dealt largely with the possible chemical configuration of lignin, a discussion ably led by Dr. Brauns. On the third morning, the practical aspects of lignin were reviewed, and its utilization was stressed. As this meeting, the industrial men had their innings and the discussion was a lively one.

Among the prominent visitors who collaborated were the following: Dr. W. G. Campbell, Officer-in-charge of Chemistry at the Forest Products Research Laboratory; Princes Risborough, Aylesbury, Bucks (England); Dr. J. Albert Hall, Director of the Pacific Northwest Forest and Range Experiment Station (Portland, Oregon); Dr. E. E. Harris and A. J. Stamm of the Forest Products Laboratory, Madison, Wisconsin; Professor Charles D. Hurd of Northwestern University (Evanston, Illinois); Professor Edwin C. Jahn of the New York State College of Forestry (Syracuse, New York); Professor Ralph L. Shriner of the State University of Iowa (Iowa City); Dr. Joseph McCarthy of the University of Washington (Seattle); Dr. J. A. F. Gardner, Forest Products Laboratory of the Canadian Department of Mines and Resources (Vancouver, B. C.); Dr. Hermann Mark of the Polytechnic Institute of Brooklyn; and Dr. Conrad Schuerch of McGill University (at Montreal). This list must not be considered all-inclusive. Frequently too, there were questions and suggestions from the industrial men in the audience, who contributed markedly to the Saturday morning session.

Because no records were kept, and since no prepared "papers" were read, the meeting throughout remained delightfully lively and spontaneous. Debates and disagreements were always good-humored and friendly. So it may be said that the meeting was a great success, and will long be remembered in Appleton and elsewhere.

—*Reported by Dr. Louis E. Wise.*

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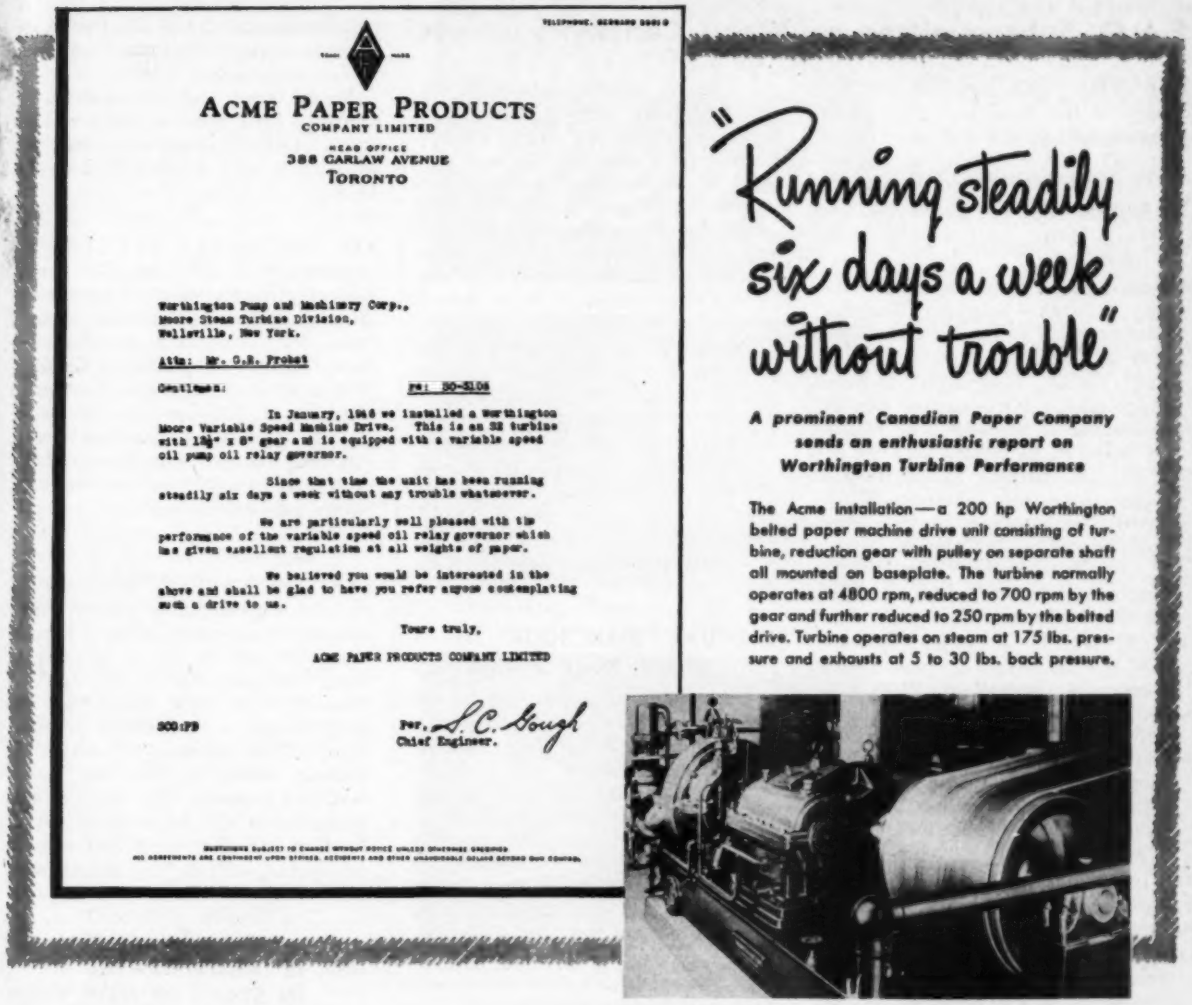
NE SECTION FOREST PRODS. RESEARCH SOC. WILL HOLD SECOND MEETING OF YEAR

The Northeast Section of the Forest Products Research Society will hold its second meeting of the current year on Thursday and Friday, October 21-22, at the Hotel Pennsylvania in New York City. Participating in the meeting will be section members and their guests from New York, New Jersey, Pennsylvania, the New England states, and Canada. The program for the inaugural session, announced by W. Burdette Wilkins, chairman of the section, has been keyed to problems currently encountered in wood-working plants.

Programs and details may be had upon request by writing Mr. F. Powell Forbes, Weyerhaeuser Timber Company, P. O. Drawer 629, Newark 1, New Jersey.



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Wellsville, New York.

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In January, 1948 we installed a Worthington Moore Variable Speed Machine Drive. This is an 32 turbine with 13½" x 8" gear and is equipped with a variable speed oil pump oil relay governor.

Since that time the unit has been running steadily six days a week without any trouble whatsoever.

We are particularly well pleased with the performance of the variable speed oil relay governor which has given excellent regulation at all weights of paper.

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A prominent Canadian Paper Company sends an enthusiastic report on Worthington Turbine Performance

The Acme installation—a 200 hp Worthington belted paper machine drive unit consisting of turbine, reduction gear with pulley on separate shaft all mounted on baseplate. The turbine normally operates at 4800 rpm, reduced to 700 rpm by the gear and further reduced to 250 rpm by the belted drive. Turbine operates on steam at 175 lbs. pressure and exhausts at 5 to 30 lbs. back pressure.

For many paper machine drives, especially on small horsepowers, the type of Worthington unit shown is the most economical and convenient. Your own conditions may call for a different type of unit—direct connected to end of line shaft or direct connected to center of line shaft. Whatever your requirements, Worthington can meet them with a drive that will give you long-lasting, cost-saving efficiency on any size of paper or board machine.

Steady Speed is one of the many advantages of Worthington Steam Turbines. The variable speed oil relay governor allows speed adjustments over a range of 10 to 1, with no change in operating speed from minimum to maximum load for any given control setting. This reduces paper breakage, permits operation at higher paper speeds, increases stability at all loads.

For further facts proving *there's more worth in Worthington*, contact your nearest Worthington Office. *Worthington Pump and Machinery Corporation, Steam Turbine Division, Wellsville, New York.*

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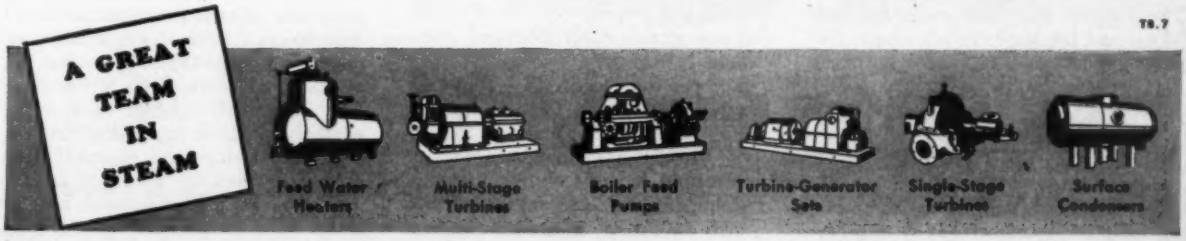

F.A.O. Subcommittee on Wood Chemistry Meets

▶▶▶ THE WOOD CHEMISTRY Group of the Food and Agriculture Organization (F.A.O. of the United Nations) held a meeting at Rutherford's Hotel in Cleveland, Wisconsin, on August 14-15.

The following delegates were in attendance:

Jean Istas, of the Ministry of Colonies, Terveren, Belgium; Professor Hermann Mark of the Polytechnic Institute of Brooklyn; Mr. N. deFelsovanyi (F.A.O., Washington, D. C.); Mr. John Al, (Organization of Applied Scientific Research, The Hague, Holland), R. G. MacDonald (T.A.-P.P.I.); Dr. Alfred J. Stamm, (Forest Products Laboratory, Madison, Wis.); J. Alfred Hall, (Forest Service, Portland, Oregon); Mr. Pierre Terver (F.A.O., Washington); Dr. W. G. Campbell (Forest Products Research Laboratory, Princes Risborough, England); Dr. E. C. Jahn (Syracuse, N. Y.); Prof. Holger Erdtman (Royal Institute of Technology, Stockholm, Sweden); Mr. C. Greaves (Forest Products Laboratory, Ottawa, Ontario); Dr. Harry F. Lewis (The Institute of Paper Chemistry, Appleton), and Mrs. G. Aulin-Erdtman, (Swedish Forest Products Laboratory, Stockholm).

The agenda included a report by Dr. Mark on the second meeting of the committee held at Geneva, in which work on wood cellulose chemistry was reviewed, and in which the author outlined technical activity in Europe. Dr. Hall read a report (prepared by George L. Drake of the Simpson Logging Co.) which dealt with attempts to integrate the forest industries of the western United States, especially by certain companies in the West Coast. Mr. P. Terver gave a report on the installation of integrated wood operations in the tropical regions.

The last-named paper was followed by a lengthy discussion in which American members of the sub-committee tried to show Mr. Terver the difficulties that would attend pulping woods in the tropics and subsequent shipment of pulp and/or paper.

The possibility of educational exchanges in the field of wood chemistry was discussed by Dr. Jahn. The term "exchanges" included professors, students and literature. In his report, Dr. Jahn called attention to those agencies which now deal with interchange of such men.

The next meeting of the committee will take place the week after the dedication of the new Wood Chemistry Institute in Stockholm (late in August or early in September 1949). Furthermore, there will be a meeting in Amsterdam and one in Helsinki to which representatives of the Wood Chemistry sub-committee will be invited. It was also hoped that American scientists (in some number) would attend the dedication of the Institute, and the question was raised as to whether a lignin round table might not be held in connection with the general program in Stockholm.

Another action of the committee was to recommend to the secretary that he obtain the names of all workers in the field of wood chemistry, and send out questionnaires which, when filled out, would indicate the facilities for work in this field. The writer is indebted to Dr. Lewis for notes on the F.A.O. Meeting.

—Submitted by Dr. Louis E. Wise

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ANNUAL "BLUE BOOK" OF WOOD PULP STATISTICS

Published annually by the United States Pulp Producers Association, the new edition of *Wood Pulp Statistics* has just been released.

This "Blue Book" of pulp statistics contains all of the available official figures on capacity, production, imports, exports, new supply and consumption of wood pulp. There are many charts that graphically illustrate the figures given in many of the tables. The material is presented in a very comprehensive manner and the contents are carefully indexed for quick reference.

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FALL MEETING OF WAXED PAPER IND. TO BE HELD IN CHICAGO IN OCTOBER

The annual Fall meeting of the Waxed Paper industry will be held October 29 at the Congress Hotel in Chicago, it was announced by A. H. Noelke, secretary-treasurer of the Waxed Paper Institute. The meeting is industry-wide and open to all manufacturers of waxed paper.

H. L. Bills, Saniwax Paper Company, Kalamazoo, Michigan, chairman of the National Merchandising Program, and Howard H. Monk of Howard H. Monk and Associates, Rockford, Illinois, will present the 1948-49 plans for the waxed paper National Merchandising Program.

An open discussion on the Statistical Program, led by T. H. Osborne of Zimmer Paper Products Company, Indianapolis, Indiana, is expected to bring out information on the current supply-demand situation.

The Industrial Relations Program will be discussed by M. M. Bartley of Rapinwax Paper Company, Minneapolis, Minnesota.

Recent trends and developments on delivered price merchandising will be covered by G. P. Lamb, of the law firm of Kittelle and Lamb, Washington, D. C.

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▶▶▶ RECENTLY ELECTED to membership in the Controllers Institute of America were: Clarence H. Ahsler, assistant comptroller of Rayonier, Inc., New York, and Earle L. Rich, treasurer-comptroller of the Fort Wayne Corrugated Paper Company, Fort Wayne, Indiana. The top financial executives of 3,172 leading American companies in every branch of industry are members of the Institute, which was founded in 1931.

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▶▶▶ THE LARGEST DISPLAY of its kind is predicted for the 9th International Heating & Ventilating Exposition which will be held at the International Amphitheatre in Chicago on January 24-28, 1949. More space has been allotted for exhibition purposes than at any previous exposition of heating, ventilating and air conditioning equipment. The exposition is sponsored by the American Society of Heating and Ventilating Engineers in conjunction with its 55th annual meeting. Charles F. Roth is manager.

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ASA IS INCORPORATED IN STATE OF NEW YORK

The American Standards Association became the American Standards Association, Incorporated, August 2, through incorporation under the laws of the State of New York. This is the third in a series of changes which have consistently recognized the enlarging scope of the Association's work.

Organized in 1918 as the American Engineering Standards Committee, a co-ordinating committee for the standardization work of five of the country's important technical societies, the scope and organizational setup were soon broadened to include associations and government agencies. This led to the extension of the work into the field of safety standards. In 1928, an entire reorganization took place, changing the committee into the American Standards Association, the nation's clearing house for standards and the U. S. medium for international contacts on standardization. The present change to an incorporated association again recognizes the enlarged activities and responsibilities of the organization, giving it and its members the protection and benefits which corporation law affords and

which is considered essential in the light of the scope of the association's activities. Bills seeking Federal incorporation are now before Congress.

Frederick R. Lack, vice president, Western Electric Company, is president of the incorporated association. Vice Admiral G. F. Hussey, Jr. (USN, ret.) is secretary and administrative head, and Cyril Ainsworth is technical director.

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▶▶▶ NATION-WIDE distribution is being given the new 1948-1949 revised booklet, *School Bibliography on Forests,* published by America Forest Products Industries, Inc. Copies are being sent to county and city school superintendents, officials of normal schools, and teachers colleges in each of the 48 states. The booklets, wall displays, and motion picture, described in the bibliography, tell a factual and interesting story intended to create better understanding of the nature, extent and problems of our forests.

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▶▶▶ CLIMAXING A SERIES of conferences on standardization, the 30th annual meeting of the American Standards Association will be held at the Waldorf-Astoria Hotel in New York City, October 20-22. A preliminary program shows several timely topics and nationally prominent speakers.

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COMING EVENTS

Sept. 27-29 — TAPPI (National) fall meeting, Mechanical Pulping Committee, Poland Springs, Me. Poland Spring House (Joint meeting with the CPPA Technical Association).

Oct. 1-2—Fall meeting of Pennsylvania-New. Jersey-Delaware Division of the American Pulp and Paper Mill Superintendents Association, Ambassador Hotel, Atlantic City, N.J.

Oct. 11-13—TAPPI (National) fall meeting, Testing Division, Pittsburgh, Pa., at the Mellon Institute (Headquarters at William Penn Hotel).

Oct. 12-16—Fifth National Chemical Exposition by the Chicago Section of the American Chemical Society, Chicago Coliseum, Chicago, Ill.

Oct. 18-22—Thirty-sixth Annual Safety Congress, Stevens Hotel, Chicago, Ill.

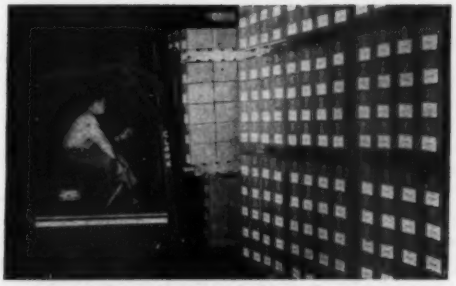
Oct. 21-23—Joint meeting of Southern and Southeastern Divisions of the American Pulp and Paper Mill Superintendents Association, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 25-28—TAPPI (National) fall meeting, Third Engineering Conference, Buffalo, N.Y., Statler Hotel and the auditorium of Westinghouse Electric Co.

Oct. 28-30—Meeting of National Paper Trade Association, Hotel Stevens, Chicago, Ill.

Oct. 29—Fall meeting of the Waxed Paper Industry, at the Congress Hotel, Chicago.

MATERIAL HANDLING News



Orderly tiering of palletized cartons to the ceiling of cold storage rooms is routine for the Elec-Clipper

Unloading material from a delivery truck with the Elec-Clipper cuts the truck's standing time, simplifies checking of shipments, speeds the movement of material

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is the versatile electric battery-powered fork truck for that multitude of handling jobs defined as "loads up to 2,000 pounds"

Potent combination of versatile utility and attractively small cost, Clark's Elec-Clipper has done an exceptional job for industry in handling materials weighing up to a ton. In the many branches of the food industry, and particularly in wholesale distribution outlets; in foundries and metal working shops, automobile plants, railway storehouses and freight depots; in truckers' freight stations and warehouses of all kinds: in all these and many other varied installations, electric battery-powered Clark Clippers enjoy admiration and respect.

With 124-inch lift on the standard high-lift model, and over-all height of only 83 inches with forks lowered, the Elec-Clipper moves comfortably and safely under 7-foot clearances, and does high tiering with amazing ease.

Finally, it costs less—a clinching benefit: less in initial investment, less to maintain, less to operate—by testimony of delighted users. That benefit is a natural result of Clark's unrivaled automotive experience and of Clark's own quantity production of nearly all component parts. It's a better machine—husky, dependable, economical—*because Clark builds it.*

To get a wholly objective survey of materials handling operations and needs in your business, talk to a Clark field representative—a competent man whose recommendations are unbiased because *Clark builds both* types of machine, gas-powered and electric battery-powered. As basic "good business" CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

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REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
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"The National Guard Defends America—Join Now"

RESEARCH DEPARTMENT AT WYANDOTTE HOLDS THIRD ANNUAL MEETING

The third annual staff meeting of the Wyandotte Chemicals Corporation Research Department, held at the Hotel Statler in Detroit on July 21, featured 19 exhibits depicting various phases of the activities of the organization and arranged in trade convention style. Featured speakers at the one day meeting were: E. M. Ford, president of Wyandotte Chemicals, W. F. Torrey, senior vice president, Ford Ballantyne, Jr., assistant vice president, and Thomas H. Vaughn, vice president in charge of research. One session of the seminar was devoted to reports by S. T. Orr, vice president in charge of production, and 12 production and engineering executives on their part in the nearly completed $30,000,000 W.C.C. expansion program and how present and contemplated research projects would affect their future manufacturing procedures.

Of particular interest to the paper industry was a display of photographs of particles of Wyandotte precipitated calcium carbonate enlarged 40,000 times. The photographs, which were produced by the research staff on their electron microscope, emphasized the wide variance in physical characteristics of the three grades of Wyandotte carbonate. Another popular display at the meeting demonstrated the use of radioactive materials as tracers in detergency studies.

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DEDICATE NORTON PLANT

In a private ceremony, on August 30, the Norton Company, Worcester, Massachusetts, dedicated a new $4,300,000 manufacturing plant. Total estimated cost of the building is $4,300,000, of which $1,800,000 was for the building alone and $2,500,000 for the equipment.

The building was especially designed and constructed to house a radically improved process of grinding wheel manufacture—a process which enables wheels to be made to new standards of precision. Abrasive grain and bond are brought into one end of the building and the various production steps take place in quick succession. A radically new feature of each production line is the continuous electric firing of grinding wheels in specially designed kilns. Modern conveying equipment has been extensively used to hold handling to a minimum. The building also houses a cafeteria, hospital, offices for the supervisory personnel, and modern lockers and washrooms.

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MICHIGAN PIPE COMPANY OFFERS NEW PROTECTION FOR WOOD PRODUCTS

Pentachlorophenol is for the first time being offered as protection against decay and insect attack of wooden and wood-lined pipe, products of the Michigan Pipe Company, Bay City, Michigan. The firm, founded in 1869, is the oldest manufacturer of wooden pipe in business today. Originally used in water works systems, the application of Michigan Pipe has been amplified until, at the present time, it serves many phases of industry. The company acknowledges the advantages of pentachlorophenol for the treatment of its products and now offers wood pipe so treated when specified by the customer.

Pentachlorophenol is found to be highly toxic to all decay-producing fungi, as well as termites and other wood destroying insects. Lasting protection is assured in treated lumber because the preservative is non-volatile and insoluble in water. It is clean and free from objectionable odors, which make it easy to handle. The preservative can be mixed with inexpensive oils possessing characteristics which permit painting after the wood has been treated. Practically colorless in solution with light oils, it does not color the grain and color of the wood.

The Michigan Pipe Company supplies paper and pulp mills, among many other users, with pipe, stacks, towers, flumes, tanks, and similar products.

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BULKLEY, DUNTON PAPER CO., S.A., EYES NEW SALES IN AFRICA & S. AMERICA

The impending establishment of sales offices in South Africa, serving as important additions to the far-flung export network of Bulkley, Dunton, was announced by George C. Cobean, president of Bulkley, Dunton Paper Company, S.A., the paper exporting unit of the organization.

Frank W. Smith, vice president, and Albert Andrews, who will have charge of the company's operations in South Africa, are now in Johannesburg for the purpose of completing arrangements for setting up Bulkley, Dunton's sales offices in strategically located cities of the Union.

After the return of Mr. Smith in November, Mr. Cobean will leave on an extended trip to the Far East and eventually around the world, with a view to further developing his company's exporting business, which now extends to four continents with over 60 offices and sales representatives in

The Norton Company recently dedicated this new plant

Sandy Hill flow control unit

combines the advantages of the Sandy Hill-Bertrams Flow Distributor with the Neilson Slice and its adjustable rubber lip

THIS unit is custom designed and custom built to fit YOUR paper machine, whether fourdrinier or cylinder.

It incorporates all of the notable advantages of two fine Sandy Hill products—the Sandy Hill-Bertrams Flow Distributor and the Neilson Slice.

The Sandy Hill Flow Control Unit makes possible the production of paper of more uniform caliper formation and strength, because it controls the mixing of the stock and assures even distribution of the flow of stock over the entire width of the machine.

A high slice is provided for fast speeds, and a low slice for slow speeds or heavy stock, or whenever a secondary slice may be desirable. The slice is carried on a pivot which allows advancement or retraction of the nose of the slice with relation to the apron board.

The apron board is substantially supported by a cast iron cross member. Adjusting screws are provided between this support and the apron board to prevent deflection, as far as this is possible.

The unit shown is arranged for deckle straps, but ruler edge deckle can be provided.

THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, N. Y.

Manufacturers of
Adjustable Cylinder Vats
Cylinder Paper Machines
Pulp Grinders
Dandy Roll Drives
Pulpers or Kneaders, Voith
Thickeners
Quick Opening Gate Valves
Bertrams Flow Distributors
Bertrams Shakes
Neilson Slice
Feltless Wet Machines
"Selective" and Corner Drives
Fourdrinier Paper Machines
"Packer" Screens
Castings
Bleaching Equipment
Scofield Felt Conditioners
Cleveland Type Bearings
Shaker Screens

virtually every important city in the world.

Juan P. Bosch, also of Bulkley, Dunton, S.A., left on August 20 for an extensive tour of the Latin American countries in central and northern South America and the West Indies. The journey will be entirely by air and will take about 90 days. The purpose of Mr. Bosch's trip is to call on the company's customers in these countries and to observe market conditions. He will visit the company's branch offices and sales representatives and supervise the reorganization of some of the offices.

▼

VISITORS ATTEND OPEN HOUSE—TOUR RYERSON'S NEW EMERYVILLE PLANT

An open-house party at the new plant of Joseph T. Ryerson & Son, Inc., in Emeryville, California, recently, celebrated the opening of the company's thirteenth unit in its nation-wide group of steel-service plants. About 3,000 persons attended the opening. Visitors were taken on a tour of the plant after which they were served with dinner in eight dining cars of the Southern Pacific Railroad, secured especially for the occasion.

Construction of the Emeryville plant was started in 1947. Including the two-story office building which forms an integral part of the warehouse structure, the plant occupies about 170,000 square feet of floor space. It is fully equipped with saws, shears, flame cutting machines and all materials handling equipment required for quick, orderly movement and shipment of bars, plates, shapes, sheets, tubing, and other steels from stock.

▼

▶▶▶ THE OPENING OF an office at 441 First National Bank Building, Houston, Texas, has been announced by Buflovak Equipment Division of Blaw-Knox Company, Buffalo, New York, manufacturers of chemical and food processing equipment and large gray iron castings. Hugh P. Coulter, sales engineer with the New York office for the last 12 years, will be in charge.

▼

GATX PUBLISHES VOLUME ON HISTORY OF COMPANY

The story of the growth of the General American Transportation, Chicago, is given in an interesting volume entitled, *GATX, a History of the General American Transportation Corporation.* The activities of the company, which started with the manufacture of freight and tank cars, have now been broadened to include steel and alloy plate and industrial equipment to be used in processing operations of chemical and similar industries.

The financial history, war record, organization, and operating policies of the company are outlined in its 198 pages. It is illustrated with photographs of personnel and plant operations. Numerous charts, tables, and a complete index are included.

Visitors from almost every city and town in Northern California attended the Open House held recently at the new Emeryville (Calif.) plant of Joseph T. Ryerson & Son, Inc.

▼

MATHIESON PURCHASES AMMONIA PLANT AND FACILITIES FROM WAA

The War Assets Administration and Mathieson Chemical Corporation have concluded an agreement for the chemical company to purchase the ammonia plant and ammonia oxidation facilities at Lake Charles, Louisiana. The purchase price was reported to be $7,063,300. This move, it is said, establishes Mathieson as a major producer of synthetic ammonia, which is today one of the important sources of nitrogen for the production of fertilizer and other nitrogen products, and is in line with Mathieson's policy of expanding its operations and broadening its field of chemical activity.

Built by Mathieson for the Defense Plant Corporation, the plant was leased to the company, and production began in the fall of 1944, the entire output going into the manufacture of high explosives for the remainder of the war period. After the war, at the request of the government, Mathieson continued to operate part of the plant for the production of nitrogen gas, used in purging the Big-Inch pipeline preparatory to placing the latter in stand-by condition. Early in 1947, Mathieson negotiated with the government a long term lease for the entire plant facilities, and after an extensive rehabilitation program, the ammonia plant was put into full operation.

The Lake Charles ammonia plant is located in the rich delta agricultural area where the heavy demand for nitrogen fertilizers is increasing and where direct application of ammonia to the soil has proved highly successful. It is anticipated that a large part of the ammonia production at Lake Charles will be used for agricultural purposes.

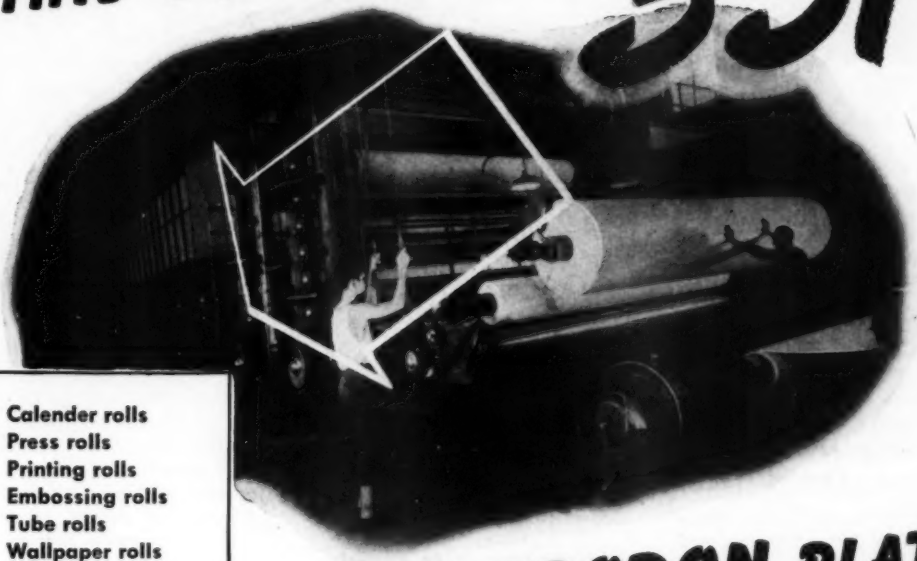
▼

BAGLEY & SEWALL SHIPS TWO CYLINDER MACHINES TO HELSINKI BOARD MILL

The Bagley & Sewall Company, Inc., manufacturer of paper- and pulp-making machinery, has been busy loading two machines for trans-shipment to Finland. It has been approximately a year and a half between the time that the contract was signed by Abe Cooper, president of the Bagley & Sewall company, at Helsinki, Finland, and the delivery of the machines.

The machines are designed to manufacture builder's board. Each of the two machines has a width of 126 inches, is equipped with seven cylinders, operates at a speed of 450 feet per minute, and has a capacity of 100 metric tons per 24 hours. Their total weight is 2,530 tons, and they were loaded and shipped out of the Bagley & Sewall shops in about 10 days, a record which company officials and employees regard as excellent for so much tonnage in that period of time.

INCREASE AVERAGE PRODUCTIVE LIFE OF THIS EQUIPMENT 331%



- Calender rolls
- Press rolls
- Printing rolls
- Embossing rolls
- Tube rolls
- Wallpaper rolls
- Sizing rolls
- Pasting rolls
- Breaker rolls
- Sweat rolls
- Creping rolls
- Table rolls
- Carrying rolls
- Idler rolls
- Drying rolls
- Couch rolls
- Screen plates
- Slice lips
- Guide bars
- Suction box covers
- Evaporator tubes
- Pump parts
- Drying drums
- Fourdrinier wires
- Shake rails
- Tanks
- Mixing kettles
- Knives

WITH CRODON PLATING

Here's how CRODON (industrial chromium plating) prolongs the life of your paper mill equipment. Application of chromium plate produces an intensely hard, smooth, protective coat on practically all base metals. It resists wear and abrasion. It retards corrosion. It insures more efficient machine performance. Replacement costs are saved. Operating delays are prevented. Improved paper quality is assured.

CRODON plating of your paper mill equipment will be done in the quickest, most efficient, and economical manner possible. When you operate with CRODON-plated machinery, you produce better paper at less cost.

Detailed information will be sent on request, or we shall be glad to discuss CRODON plating with you personally. Call or write the nearest plant.

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The Chrome Plate

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Waterbury 4-3141

1760 Lakeview Road
Cleveland 12, Ohio
Cedar 6660

4645 West Chicago Ave.
Chicago 51, Ill.
Austin 3716

BROWN INSTRUMENT BEGINS ORIENTATION PLAN FOR 40 GRADUATE ENGINEERS

A three-year program for expansion of development and production operations has been started by Brown Instrument Company, Philadelphia, division of Minneapolis - Honeywell Regulator Company as the second step in its $2,500,000 physical expansion. The first part of the three-year program has resulted in the hiring of 40 newly-graduated engineers.

According to Henry F. Dever, president of Brown, not only does this schedule mean a necessary increase in the company's engineering staff, but in several ways it contributes toward providing newly-hired graduates with a clearer and earlier insight into manufacturing methods and procedures. It speeds up their becoming well acquainted with new and modern industrial processing for which the company's devices are used.

▼

PEERLESS PUMP DIVISION MOVES INTO NEW PLANT IN INDIANAPOLIS (IND.)

The consolidation of the movement of both personnel and equipment into its new 19-acre plant site at Indianapolis, Indiana, has been completed by Peerless Pump Division of the Food Machinery Corporation, and tempo of final construction is being stepped up to make this plant one of the country's finest examples of modern pump manufacturing and production facilities.

The new Indianapolis plant is the former Fall Creek Ordnance works and was acquired from the War Assets Administration late in 1946 with a bid of $861,000.

Works manager of the Peerless Indianapolis plant is H. J. McKenzie; assistant works manager is C. N. Adams. The plant is producing units of the complete line of Peerless pumps and domestic water systems. Other departments now located at the plant include the centrifugal sales section and the small products sales section, plus a complete designing and engineering staff, supplemented by accounting and credit personnel.

▼

CONSOLIDATED CHEMICAL STARTS WORK ON ALUMINUM SULPHATE PLANT IN LA.

Construction of a $250,000 chemical plant on a 30-acre tract on the outskirts of Springhill, Louisiana, has been started by the Consolidated Chemical Industries, Inc.

The new plant will produce aluminum sulphate at the rate of 125 tons daily to service industries manufacturing paper and synthetic rubber. Aluminum sulphate also is used in water purification and many other manufacturing processes.

Sulphuric acid, one of the raw materials to be used at the plant, will be supplied by industries at Baton Rouge, Louisiana, where the firm is already established. The number of permanent employees at the new plant will not be determined until completion of construction which is expected early in the summer of 1949.

▼

NEW PLACEMENT SERVICE FOR SCIENTISTS AND ENGINEERS ORGANIZED

The Scientists' and Engineers' Association, Rock Rimmon Road, Stamford, Connecticut, recently organized as a non-profit corporation, has as a major purpose to encourage the most efficient use of scientific and engineering knowledge and experience.

As a practical means of helping scientists and engineers to use, further develop, and be paid for their highest capabilities, the Association has organized a service which specializes in placing them in employment connections throughout the United States, placing individuals only in the following classifications: chemists, chemical engineers, electrical, electronic, and radio engineers, physicists, mathematicians, metallurgists, mineralogists, ceramics and glass technologists, bacteriologists, mechanical engineers (including aeronautical, automotive, heating, etc.) and industrial and management engineers.

Executive secretary of the Association is A. D. Halliwell, formerly vice president and sales manager of Elliott Service Company, of New York, and formerly personnel director of Machlett Laboratories, Stamford, manufacturers of X-ray tubes.

▼

THER-MONIC EQUIPMENT NOW AVAILABLE UNDER RENTAL-PURCHASE PLAN

For the first time, THER-MONIC induction and dielectric heating equipment is made available to industry under a rental-purchase plan. Under this plan, recently established by the Induction Heating Corporation, Brooklyn, New York, new or used (latter when available) induction or dielectric generators may be rented on a monthly basis with the option to buy at any time. A portion of rental payments form an equity towards outright purchase.

The plan is unique in the heavy equipment field in that it benefits the following: the manufacturer who insists upon proof prior to purchase, the manufacturer who for some reason or other would rather not make an immediate capital investment, and the manufacturer whose set-up is such as to prefer a continuing pay-as-you-go arrangement.

▼

NEW FILM PREPARED BY GARDNER-DENVER

A new 16 mm. film in color, with sound, featuring heavy rock excavation on four interesting construction projects, has been prepared by Gardner-Denver Company, Quincy, Illinois. Entitled, *Man Against Rock*, this film is purely educational in nature and carries no advertising throughout its thirty-three-minute run.

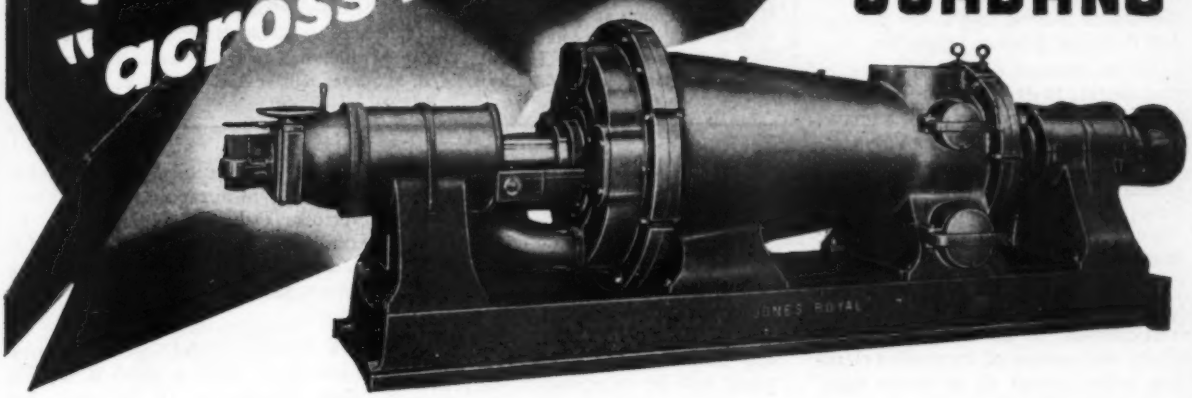
The film presents a dramatic portrayal of rock drilling, blasting, mucking, and other phases of construction work encountered in the building of highways, dams, canals, tunnels, etc.

Prints of this film are available for showing to schools, engineering societies, and other organizations interested in this type of work, and inquiries about securing prints should be addressed to Advertising Department, Gardner-Denver Company, Quincy, Illinois.

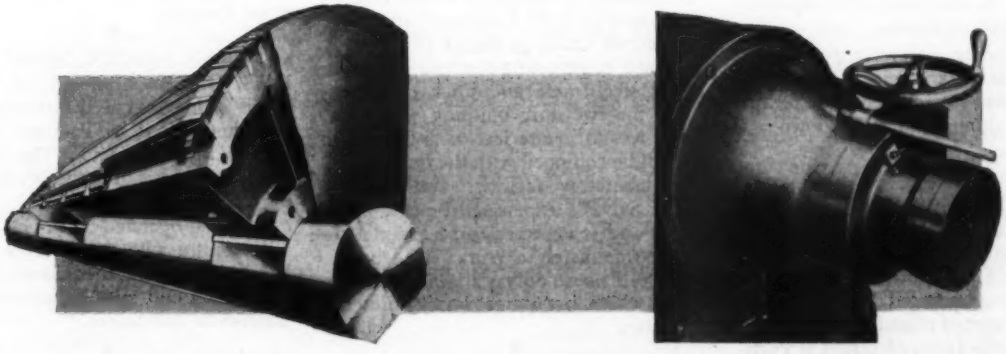
New Indianapolis (Ind.) plant of Peerless Pump Division

IMPROVES FIBERIZING "across the board"

JONES JORDANS



When it comes to fiberizing pulp for board, Jones Jordans have what it takes for sound performance: tough, rugged construction . . . ease of operation . . . special roller bearings designed for heavy loads . . . accurate thrust control of plug . . . low maintenance . . . and other features that help improve fiberizing "across the board".



TYPE W PLUG

Patent Pending

Extremely rugged . . . dynamically balanced at operating RPM.

WORM GEAR PLUG ADJUSTING MECHANISM

Hand Wheel easily turned.
Accurate finger tip control.

Ask for Bulletin No. EDJ-1007

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.
Builders of Quality Machinery for Paper Mills

MANUFACTURERS AND DISTRIBUTORS IN CANADA: WATEROUS LTD., BRANTFORD, ONT.

GRIFFIN & CO. TO MAKE FILTERING EQUIPMENT DEVELOPED BY HERSEY

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Other licensees of the Hersey filter contributing to its development are Pulverizing Machinery Company, Summit, New Jersey, Shaer & Turner Engineering Company, West Roxbury, Massachusetts, Sprake & Company, San Francisco, California, New Jersey Zinc Company, The Flintkote Company, and Russell-Miller Milling Company.

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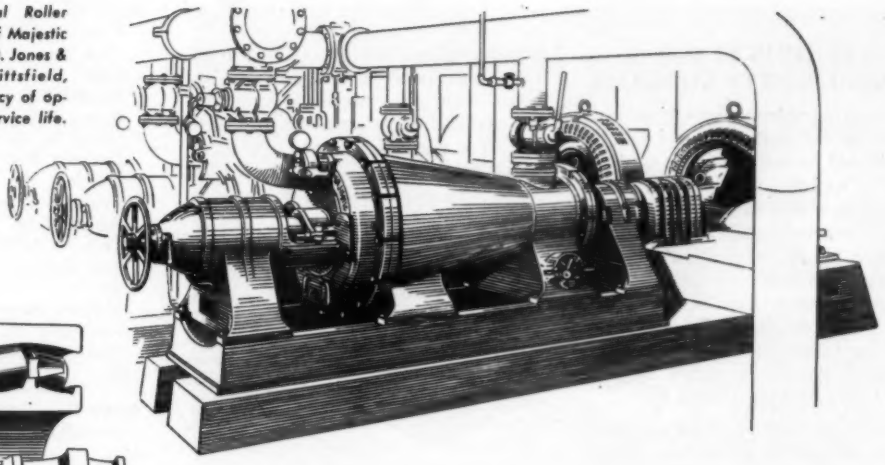
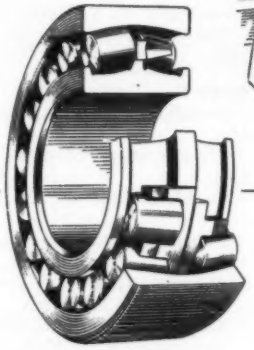
Uniform Stock Comes From Majestic Jordans Equipped with Torrington Spherical Roller Bearings

Torrington Spherical Roller Bearings on shafts of Majestic Jordans built by E. D. Jones & Sons Company, Pittsfield, Mass., assure accuracy of operation and long service life.





. . . accurate alignment and high capacity of these self-aligning units insure precision operation and long service life in Jordan engines.

E. D. Jones & Sons Company uses Torrington Spherical Roller Bearings on Jordan shafts to carry loads met in preparing fine paper stock.

These self-aligning bearings help maintain precision of adjustment and operation. The high radial capacity provides rigid support for the shaft, yet the bearings are free to adjust to deflection or misalignment. Thrust from both directions is safely handled, fixing the shaft against end play.

Maintenance can be held to a minimum. Housings and bearings form self-contained units that remain on the shaft for the life of the Jordan. They need not be removed when the plug is withdrawn for chipping or refilling.

Long service life, precision operation, easy mounting and dismounting are among the many advantages you can secure on beaters, chippers, paper dryers and calenders by using Torrington Spherical Roller Bearings for new equipment or replacements. Our engineers will be glad to help you with any bearing requirements. Contact the nearest Torrington office.

THE TORRINGTON COMPANY

South Bend 21, Ind. · Torrington, Conn.

District Offices and Distributors in Principal Cities

TORRINGTON SPHERICAL ROLLER **BEARINGS**

SPHERICAL ROLLER · TAPERED ROLLER · STRAIGHT ROLLER · NEEDLE · BALL · NEEDLE ROLLERS

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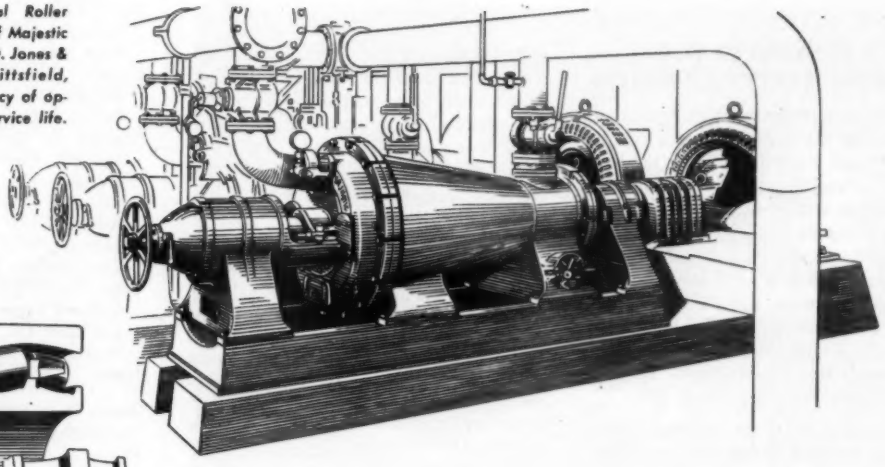
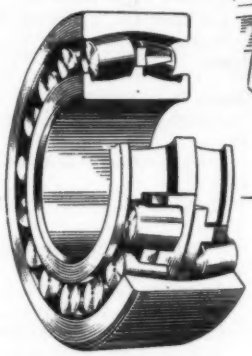
Torrington Spherical Roller Bearings on shafts of Majestic Jordans built by E. D. Jones & Sons Company, Pittsfield, Mass., assure accuracy of operation and long service life.





. . . accurate alignment and high capacity of these self-aligning units insure precision operation and long service life in Jordan engines.

E. D. Jones & Sons Company uses Torrington Spherical Roller Bearings on Jordan shafts to carry loads met in preparing fine paper stock.

These self-aligning bearings help maintain precision of adjustment and operation. The high radial capacity provides rigid support for the shaft, yet the bearings are free to adjust to deflection or misalignment. Thrust from both directions is safely handled, fixing the shaft against end play.

Maintenance can be held to a minimum. Housings and bearings form self-contained units that remain on the shaft for the life of the Jordan. They need not be removed when the plug is withdrawn for chipping or refilling.

Long service life, precision operation, easy mounting and dismounting are among the many advantages you can secure on beaters, chippers, paper dryers and calenders by using Torrington Spherical Roller Bearings for new equipment or replacements. Our engineers will be glad to help you with any bearing requirements. Contact the nearest Torrington office.

THE TORRINGTON COMPANY
South Bend 21, Ind. · Torrington, Conn.
District Offices and Distributors in Principal Cities

TORRINGTON SPHERICAL ROLLER **BEARINGS**

SPHERICAL ROLLER · TAPERED ROLLER · STRAIGHT ROLLER · NEEDLE · BALL · NEEDLE ROLLERS

EVENTS SCHEDULED FOR ANNUAL SAFETY CONGRESS

Preliminary programs have been distributed for the 36th National Safety Congress and Exposition to be held in Chicago October 18-22. Congress headquarters will be in the Stevens Hotel, and a number of the sections will meet there. However, sessions will be distributed among several large hotels: Congress, Sherman, LaSalle, and Morrison. The Industrial Exhibit will be held in the Exhibition Hall of the Stevens Hotel; the Public Safety Exhibit will be in the Sherman Hotel.

Meetings of the Pulp and Paper Section will be held at the Stevens Hotel on Monday, Tuesday, and Wednesday afternoons (Oct. 18, 19, 20). There will be a luncheon on Tuesday at 12:30 in the South Ballroom of the Stevens Hotel.

Presentation of the National Safety Council trophies to winners in the Paper Industry Safety Contest will be made at the opening session on Monday afternoon. At this time the grand prize, the Edward Benton Fritz Memorial Trophy, also will be awarded.

▼

▶▶▶ THE ESTABLISHMENT OF a statewide forest fire control system, a State Emergency Forest Fire Committee, and a Constitutional Board of Forestry which would govern all appointments to the Department of Forestry are three controls which the Georgia Forestry Association will ask the next Legislature. The proposed State Committee would be headed by the Governor and would include representatives of all state departments.

▼

NATIONAL DIRECTORY OF SAFETY FILMS PUBLISHED BY SAFETY COUNCIL

The National Directory of Safety Films, prepared by the National Safety Council in co-operation with Business Screen Magazine, has been recently published. It contains a comprehensive listing of 403 motion pictures and slidefilms, both sound and silent, for safety education within business and industry, on the farm, in homes and schools and on the streets and highways. The book is classified and indexed, with film synopsis, type, source, and availability for purchase, rental, or loan. For particulars, write to the National Safety Council, 20 N. Wacker Drive, Chicago 6, Illinois.

▼

NEW CONTEST SCORES

▶▶▶ THE LARGEST NUMBER ever registered in a contest is shown by figures released at the close of the first month of the 1948-1949 Paper Industry Safety Contest which started on July 1. Three hundred and thirty-eight units are registered; this is 13 per cent more than the number finishing the previous contest.

The first scores published for July, the first month of the new contest, showed 111 mills reporting a perfect record. Following is the list of perfect scores for the first month; these were taken from a total of 216, an incomplete return from contestants when these figures were given out:

Division I—Paper and Pulp Mills

Group A

Price Bros. & Co., Ltd., Riverbend, Quebec, Canada.
Bathurst Power & Paper Co., Ltd., Bathurst, N.B., Canada.
Marathon Corp., Rothschild, Wis.
Flintkote Co. (Pioneer Div.), Los Angeles, Calif.
International Paper Co., Palmer, N.Y.
Price Bros. & Co., Ltd., Kenogami, Quebec, Canada.
Champion Paper & Fibre Co., Hamilton, Ohio.
Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec, Canada.
Kimberly-Clark Corp., Niagara Falls, N.Y.
Hollingsworth & Whitney Co. (Algonquin & Taconnet Mills), Waterville, Me.
Kimberly-Clark Corp. (Lakeview Mill), Neenah, Wis.

Group B

Kimberly-Clark Corp., Niagara, Wis.
Kimberly-Clark Corp., Memphis, Tenn.
Hummel & Downing Co., Milwaukee, Wis.
International Paper Co., Ticonderoga, N.Y.
Owens-Illinois Glass Co. (American Coating Mills Div.), Elkhart, Ind.
Fraser Paper, Ltd., Madawaska, Maine.
Thilmany Pulp & Paper Co. (Upper Mill), Kaukauna, Wis.
Crown-Zellerbach Corp. (Port Angeles Div.), Port Angeles, Wash.
Crown-Zellerbach Corp. (National Paper Products Div.), Port Townsend, Wash.
United States Gypsum Co., Greenville, Miss.
Howard-Smith Paper Mills, Ltd., Beauharnois, Quebec, Canada.
Marinette Paper Co., Marinette, Wis.
Flintkote Co., Meridian, Miss.

Group C

Allied Paper Mills (King Div.), Kalamazoo, Mich.
Thilmany Pulp & Paper Co. (Lower Mill), Kaukauna, Wis.
Container Corp. of America, Wabash, Ind.
Price Bros. & Co., Ltd., Jonquiere, P.Q., Canada.
Blandin Paper Co., Grand Rapids, Minn.
Crown-Zellerbach Corp. (National Paper Products Co. Div.), Carthage, N.Y.
National Container Corp. of Virginia, Big Island, Va.
Lawrence Paper Co., Lawrence, Kan.
Allied Paper Mills (Monarch Div.), Kalamazoo, Mich.
The Crystal Tissue Co., Middletown, Ohio.
Mohawk Paper Mills, Inc., Cohoes, N.Y.
Lee Paper Co., Vicksburg, Mich.
Strathmore Paper Co., West Springfield, Mass.

Group D

Hollingsworth & Vose Co., East Walpole, Mass.
Container Corp. of America, Circleville, Ohio.
Container Corp. of America, Carthage, Ind.
United States Gypsum Co., Lisbon Falls, Me.
Armstrong Cork Co., Pensacola, Fla.
Central Fibre Products Co., Tama, Iowa.
The Beckett Paper Co., Hamilton, Ohio.
Hollingsworth & Whitney Co., Waterville, Me.
Whiting-Plover Paper Co., Stevens Point, Wis.
Strathmore Paper Co. (Mill No. 2), Woronoco, Mass.
Hollingsworth & Vose Co., West Groton, Mass.
United States Gypsum Co., Oakmont, Pa.
Marathon Corp., Ashland, Wis.
Ward Paper Co., Merrill, Wis.
National Gypsum Co., Kalamazoo, Mich.
Alton Box Board Co., Lafayette, Ind.
Fort Wayne Corrugated Paper Co., Vincennes, Ind.
Pacific Coast Paper Mills of Washington, Inc., Bellingham, Wash.
Container Corp. of America (California Container Div.), Los Angeles, Calif.
American Writing Paper Corp. (Crocker Div.), Holyoke, Mass.
Esleeck Mfg. Co., Turners Falls, Mass.
Spaulding Fibre Co., Inc., North Rochester, N.H.
Strathmore Paper Co. (Mill No. 1), Woronoco, Mass.
American Writing Paper Corp., (Nonotuck Div.), Holyoke, Mass.
International Paper Co., Livermore Falls, Me.
Flintkote Co., Portland, Ore.
Alton Box Board Co., Carlyle, Ill.
American Writing Paper Corp. (Albion Div.), Holyoke, Mass.
National Gypsum Co., Newburgh, N.Y.

Central Fibre Products Co., Inc., Denver, Colo.
American Writing Paper Corp. (Mt. Tom Div.), Holyoke, Mass.
Container Corp. of America, Wilmington, Del.
Kimberly-Clark Corp. of Canada, Ltd., Kapuskasing, Ont., Canada.
International Paper Co., Riley, Me.
Container Corp. of America, Tacoma, Wash.

Division II—Paper and Board Remanufacturing

Group A

Flintkote Co., East Rutherford, N.J.
The Container Co. (Div. of Continental Can Co.), Danworth, Ohio.
Gaylord Container Corp., Bogalusa, La.
Chicago Carton Co., Chicago, Ill.

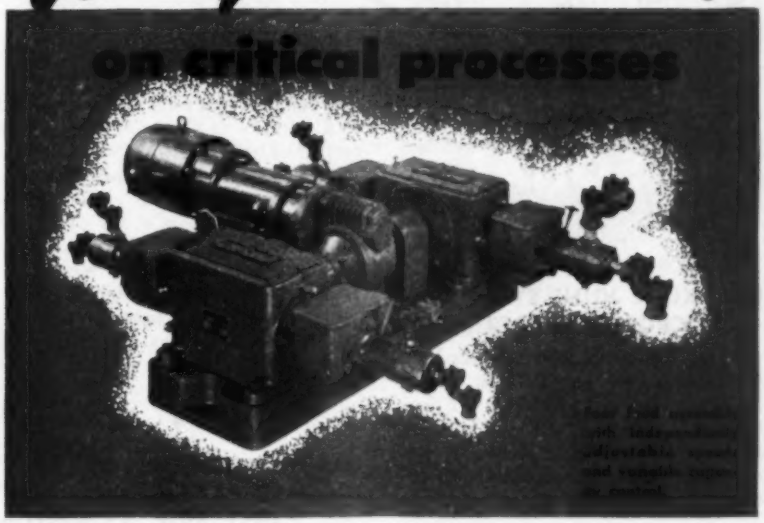
Group B

F. N. Burt Co., Inc., Buffalo, N.Y.
Container Corp. of America, Fort Worth, Tex.
Southern Advance Bag & Paper Co., Inc., Hodge, La.
Container Corp. of America, Boston, Mass.
Marathon Corp., Rothschild, Wis.
Canadian Cellucotton Products Co., Ltd., Niagara Falls, Ont., Canada.
Container Corp. of America, Anderson, Ind.
Container Corp. of America, Cleveland, Ohio.
Container Corp. of America, Los Angeles, Calif.
Container Corp. of America, Emeryville, Calif.
Old Colony Envelope Co., Westfield, Mass.
Hankins Container Co., Cleveland, Ohio.

Group C

Fort Wayne Corrugated Paper Co., Hartford City, Ind.
Allied Paper Mills (Bardeen Div.), Kalamazoo, Mich.
Container Corp. of America, Baltimore, Md.
A. B. Dick Co., (Lake St. Plant), Chicago, Ill.
Gaylord Container Corp., Dallas, Tex.
Orchard Paper Co., St. Louis, Mo.
Container Corp. of America, Seattle, Wash.
Gaylord Container Corp., Atlanta, Ga.
Gaylord Container Corp., Milwaukee, Wis.
Kimberly-Clark Corp., Appleton, Wis.
Sitroux, Inc., Clayville, N.Y.
Fort Wayne Corrugated Paper Co., Rochester, N.Y.
Pillsbury Mills, Inc., Wellsburg, West Va.
Container Corp. of America, Greensboro, N.C.
Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.
Gaylord Container Corp., Tampa, Fla.
Research Products Corp., Madison, Wis.
Hankins Container Co., Chicago, Ill.
Scott Paper Co. (Cut-Rite Div.), Sandusky, Ohio.
Bay West Paper Co., Green Bay, Wis.
Flintkote Co., Hollywood, Calif.
Container Corp. of America, Sioux City, Iowa.

ELIMINATE *Costly Time Out...*



with the completely dependable new Hills-McCanna "K" Pump

Six outstanding advantages make it possible for the new Hills-McCanna "K" Type Pump to offer more accurate metering and proportioning with less maintenance and fewer costly shut downs:

1. **STRAIGHT LINE OPERATION** — hydraulic drive eliminates mechanical linkages . . . fewer wearing parts.
2. **OIL BATH DRIVE** — hydraulic drive mechanism runs completely submerged in a bath of oil . . . less wear on moving parts.
3. **TOTAL ENCLOSURE FOR WORKING PARTS** — dust, dirt and other foreign matter can't get into the mechanism.
4. **BUILT-IN OVERLOAD RELIEF** — impossible to damage motor or mechanism by inadvertent overloading.
5. **HORIZONTAL CYLINDERS WITH TWIN CHECK VALVES** — reduces danger of air binding . . . easily disassembled without dismantling piping.
6. **EASY STROKE ADJUSTMENT** — accurate adjustment completely independent of pressure from zero to full capacity *while pump is operating.*

Hills-McCanna "K" Type Pumps are available with one or two feeds with capacities up to 300 gph per feed. Pressure ratings up to 25,000 psi. Ideally suited to remote or automatic control. Write for Bulletin PK-47. HILLS-McCanna CO., 2433 W. Nelson St., Chicago 18, Ill.

HILLS-McCANNA

metering and proportioning

pumps

Saunders Patent Diaphragm Valves

Force Feed Lubricators ***Magnesium Alloy Castings***

NAMES in the News

PERSONALS

D. B. KUHE JOINS STAFF OF CROSSETT PAPER MILLS

D. B. Kuhe has been appointed assistant manager for Crossett Paper Mills, Crossett, Arkansas, effective September 1. Prior to his appointment with the Crossett Paper Mills, he was manager of the paper mill at Atenquiqué, Jalisco, Mexico.

D. B. Kuhe

Mr. Kuhe started his career in the papermaking industry in Northern mills after graduation from the University of Wisconsin. From there he went South where, in various capacities, he acquired a practical experience in the production of Southern pulp, board, and papers.

▼

▶▶▶ Field changes announced by A. E. Staley Manufacturing Company, Decatur, Illinois, are: *Carl Gebring,* paper mill technician, who has been calling on paper mills in the New York and Pennsylvania area, has been shifted to a territory in Ohio, with headquarters in Urbana; *Lyle York,* Buffalo district manager for the industrial sales department, has been given charge also of the company's Michigan and Ohio territories. *John Harris,* who has been the Staley industrial representative in Michigan and Ohio for many years, has resigned to open his own business in Columbus, Ohio. He will act as Staley broker for industrial products in his area.

▼

JAS. H. HOOD, JR., IS NAMED PATTERSON'S NEW DIST. MGR. AT BOSTON

The Patterson Foundry and Machine Company, East Liverpool, Ohio, has announced the appointment of James H. Hood, Jr., as district manager of the company's new office at Boston, Massachusetts. Mr. Hood will service the New England territory where he has a wide acquaintance among the chemical processing plants.

A graduate of Yale University, Mr. Hood was formerly connected with the inspection division of Stone and Webster Engineering Corporation. His new offices will be located at 79 Milk Street, Boston.

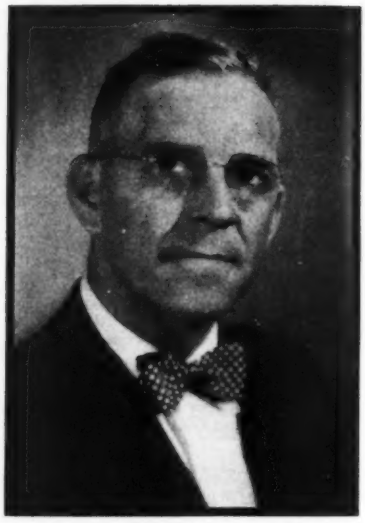
▼

WESTINGHOUSE APPOINTS McDANIEL MANAGER OF TECH. PRESS SERVICE

Hobart C. McDaniel has been appointed manager of the Technical Press Service in the Public Relations Department of Westinghouse Electric Corporation, Pittsburgh. He will be responsible for the company's publicity in the technical and trade magazines.

Mr. McDaniel will succeed Carl E. Nagel, who has resigned to join McGraw-Hill Book Company in New York as editor of mail sales books for the engineering and industrial fields.

Mr. McDaniel was graduated in electrical engineering from Oregon State College, Corvallis, Oregon, in 1926. He went with the Westinghouse Lamp Division in Bloomfield, New Jersey,



H. C. McDaniel

as commercial engineer in 1939 after working with Pacific Power and Light Company, Portland, Oregon, and Central Illinois Public Service Company, Springfield, Illinois, as a lighting sales engineer. In 1943, he joined the Technical Press Service in the Pittsburgh office.

▼

THOMAS NICHOLS NAMED CHAIRMAN OF THE BOARD FOR MATHIESON CHEMICAL

The board of directors of Mathieson Chemical Corporation, New York City, has elected Thomas S. Nichols, president and chief executive officer, to the additional post of chairman of the board to succeed the late George W. Dolan. J. C. Leppart, vice president, was elected a member of the board to fill the vacancy caused by Mr. Dolan's death and was appointed executive vice president.

Prior to being named president of Mathieson this April, Mr. Nichols was actively engaged in various phases of the chemical industry, having served the government during the war in several capacities in this country and Europe. He completed his service with the government as a member of the Technical - Industrial Disarmament Committee on Chemicals.

Mr. Leppart also joined Mathieson in April. During the war, he was with the War Production Board, devoting his efforts to alkalies, chlorine and related products.

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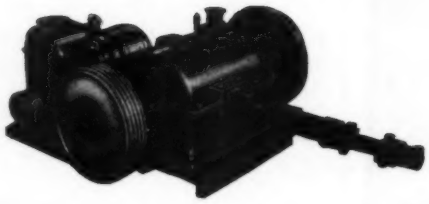
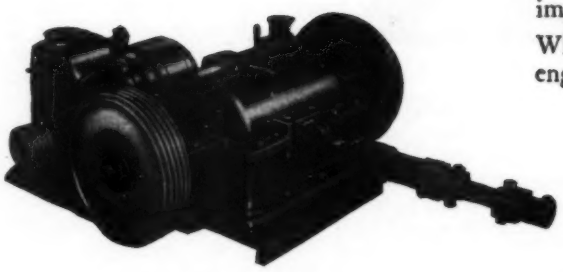
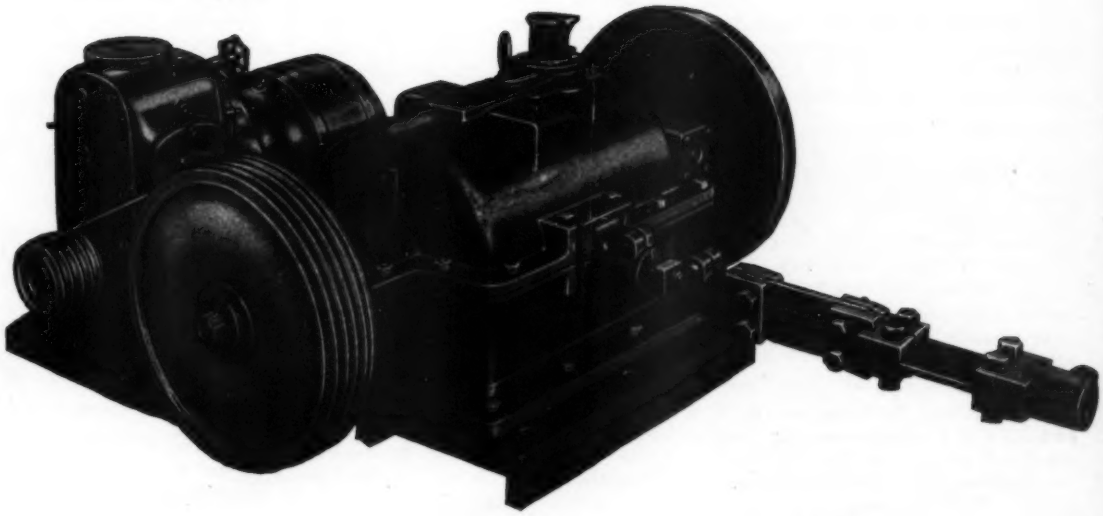
▶▶▶ The position of vice president has been voted to *Lee Hickox* of Container Laboratories, Inc., Chicago. Mr. Hickox will continue in the Chicago office where he has been located since joining the organization.

SHAKES







The Bagley and Sewall Simplex Shake is the most compact, easily adjusted, self-contained shake in the paper industry today. It is based on an eccentric strap connected directly to the fourdrinier. The adjustment of speed and stroke are made while the machine is running.

This shake has stood up under heavy mill operation with negligible maintenance costs. All moving parts receive constant lubrication so that wear is reduced to a minimum.

Several of these units may be installed on a common shaft to give the desired degrees of shake at different points along the forming table. This control greatly improves the formation on the wire.

When ordering new equipment, contact our sales engineers.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

WATERTOWN, NEW YORK

RICHARD PORTER IS NOW EDITORIAL DIRECTOR OF "THE PAPER INDUSTRY AND PAPER WORLD"

Richard W. Porter

On September 1, Richard W. Porter took over the position as editorial director of THE PAPER INDUSTRY AND PAPER WORLD. Mr. Porter will maintain headquarters at the main office of Fritz Publications, Inc., publisher of the magazine, in Chicago. However, he will spend considerable time in the field contacting the entire industry. New ideas of management, technology, and operations will be explored and developed to form the basis of editorial service to the industry.

A broad background of experience in the paper industry, as well as an important publishing connection, particularly fit Mr. Porter for this important post. Since 1945 he has been associated with McGraw Hill Publishing Company on the editorial staff of *Chemical & Metallurgical Engineering* (now *Chemical Engineering*).

Mr. Porter graduated with a B.S. degree from the University of Washington in 1936. He was first connected with Crown Zellerbach Corporation, Port Townsend, Washington, in the technical control department. Four years later, he was transferred to the company's tissue, towel and specialty mill at Carthage, New York, where, successively, he held positions in the technical control, engineering, and purchasing departments. In 1942 he left Crown Zellerbach to become application engineer with The Brown Instrument Company, Philadelphia, which position he held until going with McGraw-Hill.

Mr. Porter is a member of the American Chemical Society and the Technical Association of the Pulp and Paper Industry; he is chairman of the TAPPI Mill Instrument Control Committee. A former member of the Delaware Valley TAPPI Section, he is on the Advisory Committee of the newly-formed Metropolitan Group of the Empire State Section.

▶▶▶ When he left New York City on August 27, *Karl E. Sundqvist,* president of Industria, Inc., expected to spend two months visiting paper mills in Brazil, Uruguay, and Argentina. During his tour, Mr. Sundeqvist will confer with company representatives and personally handle queries that have come from customers.

▼

▶▶▶ *Ralph S. Drummond* has been appointed manager of the Cincinnati branch office of Crocker-Wheeler Electric Manufacturing Company (Ampere, N.J.), a division of Joshua Hendy Corporation. Mr. Drummond formerly was sales manager for the Dynamotor Corporation.

▼

▶▶▶ Two new appointments have been made recently at the Byron Weston Company, Dalton, Massachusetts. *F. S. Klein* has been appointed mill manager and will take charge of all departments from the rag room to the shipping department. He has been with the company since December, 1935, and until his recent appointment was technical director. *Leonard P. Taylor* has been placed in charge of special work that has arisen in connection with the development of new types of paper in which the company is interested.

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▶▶▶ The new general manager of the National Paper Container Corporation, Ransom, Pennsylvania, is *James Allen,* who was formerly with Johnson & Johnson Company, New Brunswick, New Jersey.

▼

▶▶▶ Honors were conferred upon *D. C. Everest* and *Fred C. Boyce* at a recent meeting of the Camp Manitowish Committee of the YMCA when plaques were awarded for meritorious service on the Committee. Mr. Everest has been chairman of the Committee for more than 25 years and Mr. Boyce has been a Committee member for that length of time. Camp Manitowish is a YMCA Camp, located on Boulder Lake, Boulder Junction, Wisconsin; it is probably the finest camp of its kind in the United States.

▶▶▶ Treasurer of the Hammermill Paper Company (Erie, Pa.) since its founding in 1898, *Dr. Otto F. Behrend,* observed fifty years of service with the firm July 31. He received a gold pencil and a booklet containing the names in gold of the mill's Cosmos Club. He also is a member of the firm's board of directors and of its executive committee.

▼

▶▶▶ Assistant director of the United States Forest Products Laboratory at Madison, Wisconsin, *L. J. Markwardt,* has been elected vice president of the American Society for Testing Materials.

▼

▶▶▶ Officials of the De Laval Steam Turbine Company have announced the appointment of *J. A. Greenland* as district manager of the De Laval Seattle office. Graduated from the Rose Polytechnic Institute in 1938, Mr. Greenland joined the company in the same year and was for some time associated with its main office in Trenton. He has been with the Seattle office since 1940.

▼

▶▶▶ The Strathmore Paper Company, West Springfield, Massachusetts, announces the appointment of *John Rigby, Jr.,* as director of the Strathmore Community Club in Woronoco, a club maintained by the company for the benefit of its employees in the Woronoco division and their families. Mr. Rigby resigned as boys' and young men's secretary of the Westfield YMCA to accept his new position.

▼

▶▶▶ At a recent meeting of the board of directors of United Board & Carton Corporation, *William H. Allen,* sales manager for cartons, was elected vice president. He was previously connected with the Sutherland Paper Company and came to United in 1947.

▼

▶▶▶ The resignation of *Murray H. Bennett* as sales engineer of the Stebbins Engineering & Manufacturing Company (Watertown, N.Y.) has been announced. The company has transferred John E. Maxson to its sales engineering staff.

▼

The appointment of *John T. Kiley,* manager of O. Hodgkins and Company, Boston, wastepaper dealers, as manager of the Boston division, James Flett Organization, Inc., has recently been announced. Mr. Kiley, who on September 1 will assume his new duties at 75 Federal Street, succeeds *Miss L. G. Wonnacott,* who is retiring from active business.

Jacketed Drier Rolls Paid for Themselves in 268 Days!

THIS IS HOW IT WAS FIGURED

$$\frac{\text{Tons produced by machine per day}}{\text{Total number of drum driers}} \times 15\%^{*} = \text{Additional tons per Lukenweld Drier per day}$$

$$\frac{\text{Cost per Drier}}{\text{Additional tons} \times (\text{Operating Cost} + \text{Operating Profit})} = \text{Number of days for LW Rolls to pay for themselves}$$

*15% is the increased production per Lukenweld Drier and with all rolls (cast and Lukenweld) operating at only 50 psi.

A company which installed Lukenweld Jacketed Drier Rolls to replace several cast iron rolls in a drying machine showed that the Lukenweld Rolls paid for themselves in 268 days. This was the result of the 15% additional output per Lukenweld Roll. From then on the increased production was clear profit.

In its estimates the company used these costs:

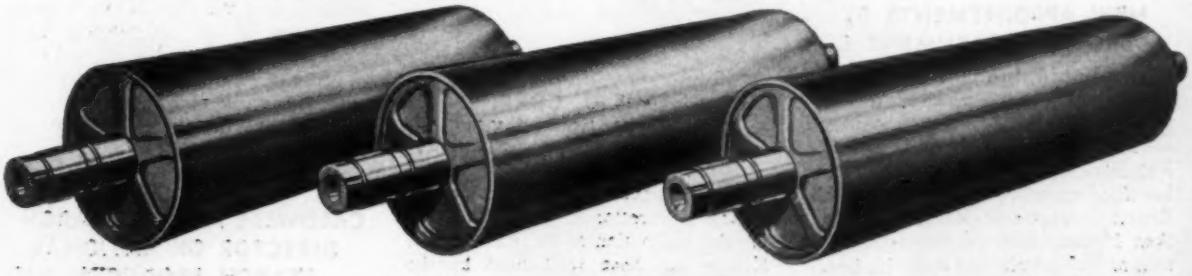
$40.00 = Raw Material Cost
+$25.00 = Operating Cost
$65.00 = Cost per Ton of Product

Based on a selling price of $85.00 per ton, there was an operating profit of $20.00.

Using the above formula based on all rolls operating at 50 psi steam pressure, the user showed that the Lukenweld Rolls paid for themselves in 268 days.

This company, however, is running its Lukenweld Rolls at 150 psi. Had the estimate been based on this higher pressure, with the resultant 48% additional output per Lukenweld Roll, it would have shown that the rolls had paid for themselves in 85 days.

For additional details, write to Lukenweld, Division of Lukens Steel Company, 408 Lukens Building, Coatesville, Pa.



LUKENS
LUKENWELD DIVISION

LUKENWELD
DRIER ROLLS AND DRYING MACHINERY

VAN BECKUM ADVANCED TO NEW SILVACON POST

W. G. Van Beckum, assistant manager of the Weyerhaeuser Timber Company's development department at Longview, Washington, for the past

W. G. Van Beckum

year, has been named manager of the technical service of the Silvacon sales department of the company.

Mr. Van Beckum was active in technical work leading to the production of Silvacon, a new family of raw materials from Douglas fir bark.

▼

▶▶▶ The resignation of *Benton R. Cancel* as vice president of the Powell River Company, Ltd., effective October 1, has been announced recently. On that date, he will rejoin the St. Regis Paper Company, Deferiet, New York, where he will became general manager of the Printing, Publication, and Converting Paper Division.

▼

WEST AND SLATER GIVEN NEW APPOINTMENTS BY BROWN INSTRUMENT CO.

The Brown Instrument Company, Philadelphia, has announced the appointment of Ray R. West to manager of sales of Minneapolis-Honeywell Regulator Company. Mr. West, who has filled executive sales positions with Brown Instrument during his more than 20 years with the industrial division of Honeywell, will make his headquarters at the main office in Philadelphia.

Lloyd E. Slater has been appointed industry engineer in charge of food industry applications for measuring and controlling devices, made by Brown Instrument Company and Minneapolis-Honeywell Regulator Company. Mr. Slater has been working in the food industry for Brown for the past several years.

▼

▶▶▶ Formerly paper mill superintendent of the Brompton Pulp & Paper Company, Ltd., Red Rock, Ontario, *A. C. (Bob) Fuller* has resigned that position to take on the same duties at the new mill of Fibreboard Products, Inc., Antioch, California. Mr. Fuller took over his new position on September 1.

▼

PERSONNEL CHANGES AT FT. WAYNE CORR. PAPER CO.

The board of directors of the Fort Wayne Corrugated Paper Company, Fort Wayne, Indiana, has announced the acceptance of resignation of William Waterfield as vice president in charge of sales and of Paul Dickmeyer as assistant treasurer. Mr. Dickmeyer will retain his position as assistant secretary of the company.

G. Thomas Evans has been elected to succeed Mr. Waterfield. Mr. Evans formerly was division sales manager of the company's Chicago territory and has been associated with the company since 1927.

Robert M. Briggs, who is being advanced from territory sales promotion, will replace Mr. Evans as manager of the Chicago division. He has been with the company for six years.

Albert C. Kanning was elected assistant treasurer to replace Mr. Dickmeyer.

▼

▶▶▶ Announcement has been made of the election of *Robert J. Russell* as secretary of Hardinge Company, Inc. (York, Pa.), and also of his formal appointment as chief of the technical staff of the Hardinge organization. He began work at Hardinge in 1929 as a service engineer. In recent years he has specialized in the design and development of wet and dry grinding systems.

▼

SUN CHEMICAL CORP. APPOINTS DR. TEETERS DIRECTOR OF RESEARCH

The appointment of Dr. Wilbur Otis Teeters as director of research following the resignation of Dr. Paul V. McKinney has been announced by the Sun Chemical Corporation, New York City.

Dr. Teeters joined Sun Chemical as principal research chemist in February, 1946. The following January, he was assigned the additional responsibility for supervision of Sun's research laboratory in Harrison, New Jersey.

Prior to joining Sun Chemical, Dr. Teeters had been research chemist with Rohm & Haas and with the Ammonia Department of DuPont and supervisor of chemical research with the Barrett Division of Allied Chemical & Dye Corporation. He holds degrees from the Universities of Iowa and Illinois.

▼

MARATHON CORP. PLACES NOEL KEELER IN CHARGE ACCOUNTING & FINANCE

The board of directors of Marathon Corporation (Rothschild, Wis.) has elected Noel E. Keeler vice president in charge of finance and accounting.

Mr. Keeler goes to Marathon from Sylvania Electric Products, Inc., New York City, where for seven years he

Noel E. Keeler

was vice president, controller and a member of the finance committee. In addition to broad financial and accounting experience, his background includes many years of management engineering work in both the domestic and foreign operations of the Armstrong Cork Company.

Mr. Keeler is a director of the Controllers Institute of America and chairman of the Institute's budget and finance committee.

▼

CALDWELL MADE RESEARCH DIRECTOR OF NATIONAL STARCH PRODUCTS, INC.

Dr. Carlyle G. Caldwell, a member of the research staff since 1940, has been appointed research director of National Starch Products, Inc., New York City.

TWO MORE NORTHWESTS

Handling Pulpwood

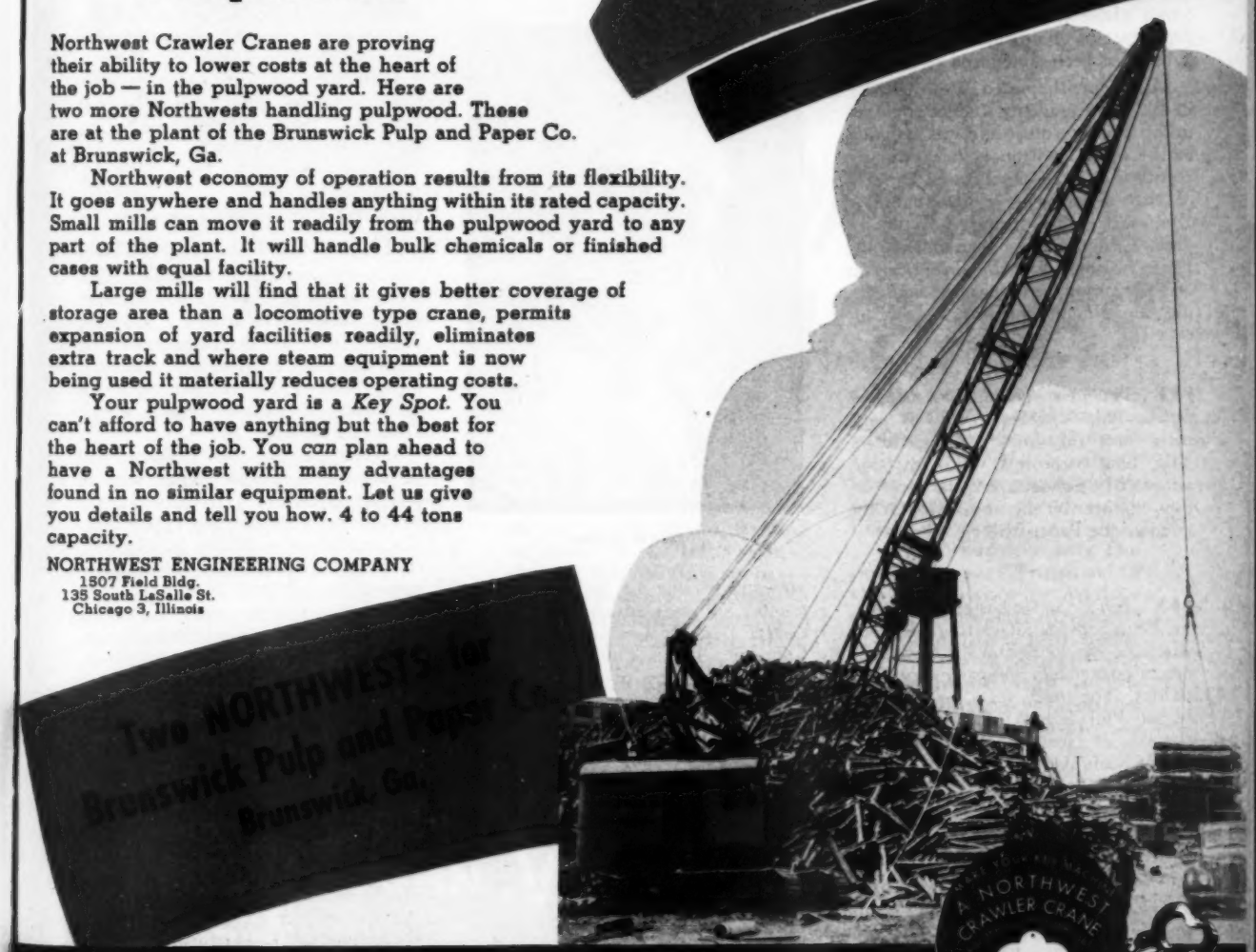
Northwest Crawler Cranes are proving their ability to lower costs at the heart of the job — in the pulpwood yard. Here are two more Northwests handling pulpwood. These are at the plant of the Brunswick Pulp and Paper Co. at Brunswick, Ga.

Northwest economy of operation results from its flexibility. It goes anywhere and handles anything within its rated capacity. Small mills can move it readily from the pulpwood yard to any part of the plant. It will handle bulk chemicals or finished cases with equal facility.

Large mills will find that it gives better coverage of storage area than a locomotive type crane, permits expansion of yard facilities readily, eliminates extra track and where steam equipment is now being used it materially reduces operating costs.

Your pulpwood yard is a *Key Spot.* You can't afford to have anything but the best for the heart of the job. You *can* plan ahead to have a Northwest with many advantages found in no similar equipment. Let us give you details and tell you how. 4 to 44 tons capacity.

NORTHWEST ENGINEERING COMPANY
1507 Field Bldg.
135 South LaSalle St.
Chicago 3, Illinois



NORTHWEST

The Crane that goes Anywhere!

A native of Little Rock, Arkansas, Dr. Caldwell attended Iowa State college, graduating in 1936, and received a Ph.D. degree in chemistry from the same institution in 1940.

A recognized authority on the modification and application of starch products, Dr. Caldwell will continue to direct the development of Amioca, a waxy corn starch, as well as the extensive starch, synthetic polymer, and adhesives research program of the parent company and its National Adhesives Division.

▼

MONTEITH VICE PRES. IN CHARGE OF ENGINEERING AT WESTINGHOUSE CORP.

A. C. Monteith, 46-year-old engineering executive of the Westinghouse Electric Corporation, has been elected vice president in charge of engineering and research, succeeding Marvin W. Smith whose election as executive vice president of Baldwin Locomotive Works has been announced recently.

Mr. Monteith joined Westinghouse in 1923 as a graduate student engineer in the training course and was assigned to the central station engineering department in 1924. He became manager of that department in 1938 and in 1941 was named manager of the industry engineering department. In 1945, he took over the dual position of manager of headquarters engineering departments and director of education.

▼

▶▶▶ The new construction manager of the Pulp and Paper Mill Department for C. M. Guest & Sons, Greenville, South Carolina, is *Sigurd Solvason*. Mr. Solvason was the construction engineer on the installation of the Atenquique Paper Mill in Mexico.

▼

▶▶▶ *Ben P. Steele* has resigned from the Penn Salt Manufacturing Company where he was located in the New York offices engaged in company export activities. For many years he had been in the Philadelphia office supervising the sale of caustic soda, chlorine and other chemicals.

▼

GROMAN AND RICHARDSON APPOINTED TO EUTECTIC REGIONAL SALES BOARD

Robert H. Groman and L. D. Richardson have been appointed to the Board of Regional Sales Supervisors by the Eutectic Welding Alloys Corporation, manufacturers and distributors of low heat gas and arc welding rods and fluxes. Mr. Groman will assume duties for the west central area of the United States, while Mr. Richardson will take over the south central area.

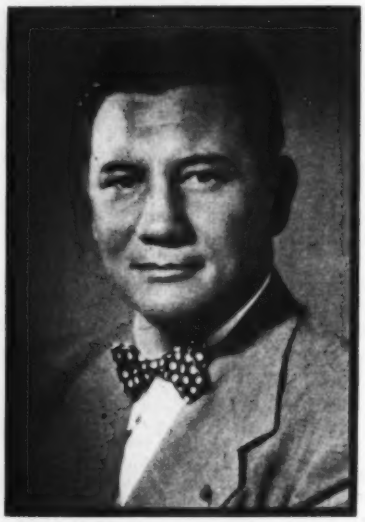
Both men are well qualified for their tasks. Mr. Groman was active during World War II both in production and as a welding instructor, and Mr. Richardson has had experience in the welding field in ship building and structural iron work.

▼

NORTON JACKSON IS NEW ADVERTISING MGR. ST. REGIS SALES CORP.

The appointment of Norton B. Jackson as advertising manager of the St. Regis Sales Corporation, New York City, has recently been announced.

Mr. Jackson came to St. Regis from the American Can Company where he had acted as advertising manager, and



Norton B. Jackson

previous to that he had been for a number of years advertising manager of the Thatcher Glass Manufacturing Company, Inc., at Elmira, New York.

He is a member of the Job Finding Committee of the Advertising Club of New York and of the Public Relations Committee of the Boy Scouts of America.

▼

▶▶▶ Announcement has been made of the resignation of *J. D. Brown* from the position of manager of the Pulp and Paper Division of Sprout, Waldron & Company, Muncy, Pennsylvania.

▼

▶▶▶ At the recent annual meeting of the board of directors of the Keith Paper Company, Turners Falls, Massachusetts, *T. Richard Probst* was appointed vice president in charge of operations. He had been acting assistant manager and assistant treasurer during the past year. All other officers as well as directors were re-elected.

▼

ROBT. M. SWANEY ELECTED PRESIDENT & TREASURER OF FRANKLIN PAPER CO.

Connected with the Franklin Paper Company in Holyoke, Massachusetts, for the past 18 years, Robert M. Swaney has been elected president and treasurer succeeding the late George C. Watson. He will continue as general manager, a position to which he was appointed on January 1, 1941.

Educated at the University of Pittsburgh, Amherst College, and Grove City College, Pennsylvania, Mr. Swaney entered the Franklin Mill as a beater helper. Later he was employed in the millwright, traffic, and finishing departments. He served as assistant superintendent before his appointment as superintendent in 1936.

Keith Fletcher, who has been associated with the company for the past year and a half, has been elected to the board of directors.

▼

WM. GILLESPIE HEADS NEW DEPARTMENT WITH DISSTON

The appointment of William P. Gillespie as manager of its new Market Requirements Department, effective September 1, has been announced by Henry Disston & Sons, Inc., Philadelphia. Since 1944, Mr. Gillespie has been assistant manager of sales in the Hardware Division.

In his new post, Mr. Gillespie will be assisted by a well chosen staff of product specialists. The New Market Requirements Department's chief function, according to Walter H. Gebhart, company vice president, will be to interpret the requirements of customers on product design, utility, packaging and other features, after carefully analyzing the facts.

▼

FRANK VAUGHAN, SALES MGR. OF SPROUT WALDRON'S PULP AND PAPER MACHINERY DIV.

Sprout, Waldron & Company, Muncy, Pennsylvania, has announced the appointment of Frank C. Vaughan as sales manager of its Pulp and Paper Machinery Division. This appointment fills the vacancy created by the recent resignation of J. D. Brown, who is well known to the industry.

Mr. Vaughan comes to Sprout-Waldron with a broad background in the pulp and paper industry. His experience in the fields of engineering, oper-

WALDRON MACHINES

Next to the raw material itself one of the most important factors in producing paper products is the WALDRON Converting Equipment used to fashion them. It is through the modern WALDRON Machines, for coating, printing, embossing, laminating, gumming, waxing, crepeing and treating that sheets of raw paper stock are transformed into products of beauty and utility. Working in close cooperation with paper makers and converters, WALDRON engineers are constantly expanding the range of processing possibilities with the result that new ingenious paper products are continually being developed.

Why not investigate the possibility of improving the appearance or quality of your present product; of developing a new product? Our Research and Development Staff with Test Laboratory facilities can give you valuable assistance. Consult us, in confidence, of course.

Coating Machines
Creping Machines
Embossing Machines
Floor Cov. Machines
Gumming Machines
Laminating Machines
Printing Machines
Rubber Mill Machines
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BUILDERS OF QUALITY MACHINES SINCE 1827

ation and management, includes employment with Halifax Paper Company, Inc., Hummel-Ross Fibre Corporation, and the Carthage Machine Company.

Under the direction of Mr. Vaughan, Sprout Waldron is now expanding its facilities for sales and service to the pulp and paper industry by setting up an organization of regional sales representatives, who will devote their full time to the needs of the industry.

▼

▶▶▶ New field manager of the Midwestern Division of National Starch Products Inc., is *Lester Klempner*. He will be stationed at the company's Chicago office. Mr. Klempner joined the company in 1935. When he entered the Service in 1942, he was sales representative at Baltimore. After returning from the Navy, he organized the Atlanta Branch Office of National Starch Products, and its affiliate, National Adhesives.

▼

▶▶▶ A position on the New England sales force for the Industrial Division of Nopco Chemical Company (Harrison, N.J.) and for its subsidiary, Metasap Chemical Company, has been delegated to *William J. Gavin*. He succeeds Joseph E. Connell who recently transferred.

▼

▶▶▶ Absent from the Weyerhaeuser Timber Company's pulp division since 1941, *G. V. Palmrose* has returned to the mill technical department staff at Longview as a chemical engineer. In the interval since 1941, he has held positions with Dow Chemical, the Bonneville Power Administration, and the Riverton Arms Corporation.

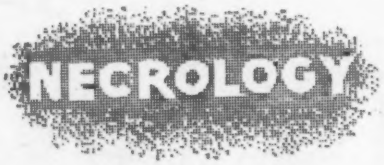
▼

▶▶▶ Chief inspector for Allis-Chalmers Mfg. Company, Milwaukee, for the last thirty-two years, *G. William Warner,* has retired after fifty years of service. For a time he had been chief inspector of the company's Scranton (Pa.) plant, and in 1912 he came to Milwaukee as hydraulic inspector.

▼

▶▶▶ The newly-appointed territorial representative of the Brown Company, Berlin, New Hampshire, covering South Carolina, Georgia, Alabama, Tennessee, and Florida, is *Sanford B. Head*. Mr. Head has been employed in sales promotion work by the Brown Company for the past year.

▶▶▶ Formerly connected with the St. Louis district, *Charles J. Bainum,* has been appointed assistant manager of the Cincinnati district of the Philip Carey Manufacturing Company, Lockland, Ohio. He replaces *E. W. Galloway* who has been named district manager in the new Pittsburgh office.



MARK S. WILDER

Prominent in the paper industry in northern New York for many years, Mark S. Wilder passed away August 18 at the age of 86.

One of the founders of the West End Paper Company, Carthage, New York, Mr. Wilder was secretary and treasurer when it was incorporated in 1901; the late James A. Outerson was president. The same year, the two men formed the Champion Paper Company in Carthage.

In 1905, the Diana Paper Company was formed at Harrisville, New York, with Mr. Wilder as a director, and in 1907, he and his brother, Frank P. Wilder, acquired control of the business. Later, he formed the Remington-Martin Paper Company.

Mr. Wilder also was a leader in banking and power development in northern New York, and he was the founder of the Colonial Motor Coach Lines, forerunner of the Eastern Greyhound Lines. He is survived by his son and daughter.

▼

ALBERT NEWCOMBE

Well known throughout the paper industry, Albert Newcombe passed away suddenly September 1 in Calais, Maine, while on a motor trip. He was 69 years of age.

Long prominent as a paper mill engineer, Mr. Newcombe had been treasurer and a director of the Southland Paper Mills, Inc., Lufkin, Texas, since its inception in 1940.

Mr. Newcombe was a native of New York City. He started his career in 1900 just after his graduation from Yale as a civil engineer. His first position was with the Lake George mill of International Paper Company at Ticonderoga, New York. Six years later, he reorganized a lumber concern, the Finch-Pruyn Company at Glens Falls, New York, and constructed for it a paper mill. In 1909 he organized and built the Tidewater Paper Mill in Brooklyn.

From 1914 to 1917, Mr. Newcombe resided in England, where he was associated with the late Lords Northcliffe and Rothermere, newspaper publishers, in procuring newsprint. Following his return to America, he was an organizer and officer of the Newcombe-Hawley Company, a wood pulp concern, which became the United Reproducers Company, early producers of radio loudspeakers from wood pulp. In 1934, he joined the Perkins-Goodwin concern, being named a director in 1937 and a vice president in 1942. He retired from the company last year.

Surviving are the widow, a daughter and a son.

▼

▶▶▶ Superintendent of the Mt. Tom Division of the American Writing Paper Corporation, *James N. Lister,* of Holyoke, Massachusetts, passed away July 29. Mr. Lister had been employed in the Eagle-A mills for 30 years. A native of Wuth-on-Don, England, he came to this country as a child and lived in Holyoke and South Hadley the greater part of his life.

▼

HOWARD BUTT

Vice president and manager of the New York office of The Wm. Powell Company, Howard Butt passed away at his home in Side Hill, Morristown, New Jersey, on August 23. He was 58 years of age.

Howard Butt

Mr. Butt had been associated with The Wm. Powell Company since 1930. He became a vice president in 1944. He had formerly been associated with several large engineering organizations in sales, engineering and managerial capacities.

▼

▶▶▶ The northeastern sales representative of the Great Northern Paper Company, *Donald A. Morrison,* passed away August 4 in Greenwich, Connecticut, at the age of 46. Mr. Morrison joined the sales department of the paper company in January, 1936, and occupied the offices at 343 Madison Avenue, New York. Surviving are his widow, two daughters, and a son.

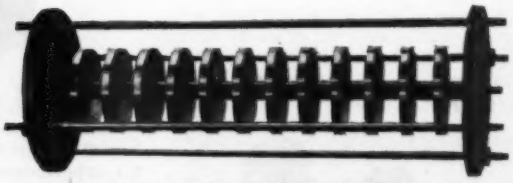
Where metal meets corrosion

IT'S A JOB FOR Chemalloy

This illustration of a turbine runner shows the broad scope of Chemalloy for corrosion applications. This particular 1600-pound, 35.5-inch, Chemalloy casting is used in water to resist oxidizing mineral and organic acids that corrode ordinary metals. But no matter what your corrosion problem is, where metal meets corrosion, it's a job for Chemalloy.

Size, weight or form make no difference. It's the combination of correct corrosion-resistant alloy, proper casting design and modern foundry technique that are the important factors. It's the quality, inside and out, of finished alloyed castings—their success in resisting corrosion—their *good results* on the job, that count.

You buy *good results* when you specify Chemalloy. For an individual alloy recommendation, send full particulars of your corrosion problem to Electro-Alloys Division, Elyria, Ohio.



These Test Discs Solve Special Corrosion Problems. If studies of your alloy requirements do not supply sufficient information on which to base alloy recommendations, these test discs are put to work in your plant. Exposed to actual service conditions under which your castings will be used—they determine the correct alloy for your job.

SPECIFY **CHEMALLOY** FOR CORROSION RESISTANCE... **THERMALLOY** FOR HEAT AND ABRASION RESISTANCE...

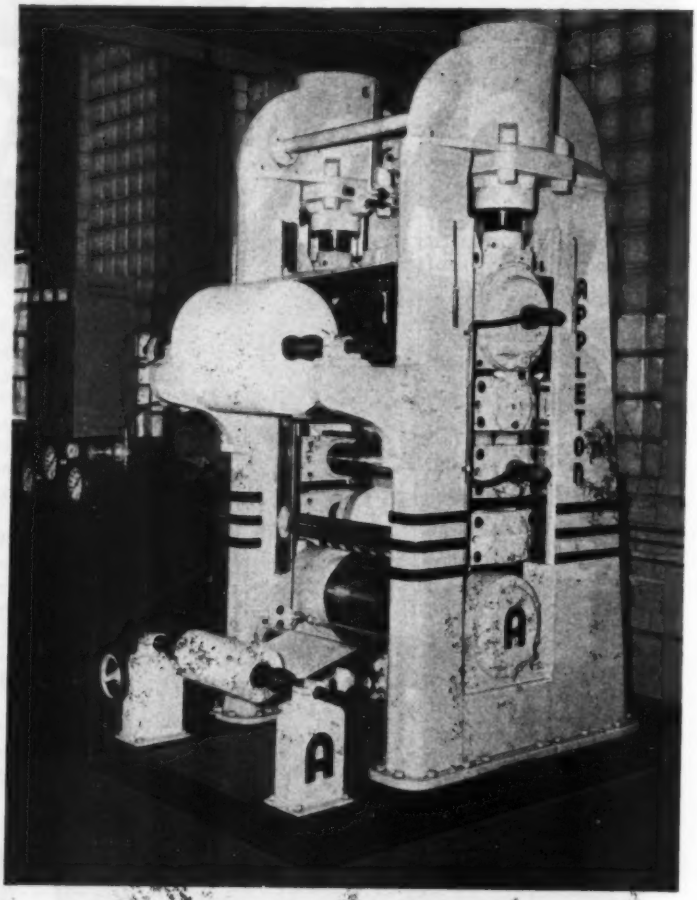
Mixer Arms • Filter Drums • Fittings • Dryer Parts

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO

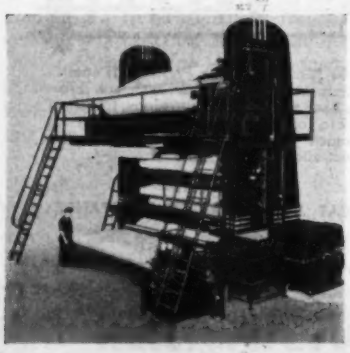
WITH ALL THE LATEST APPLETON FEATURES FOR FINE PERFORMANCE

Full advantage has been taken of the latest mechanical and electrical advancements in building today's Appleton Supercalenders. Modern designing and engineering have incorporated many new features for smoother operation and outstanding paper finishing performance. Finger-tip control, precision production, vibrationless operation and easy maintenance are some of the advantages gained. Special filled rolls were developed to give extra long service at high speeds and pressures. From the self-contained hydraulic pressure unit and the enclosed oil feeding system to the draw or spread rolls, Appleton Supercalenders are engineered to produce exceptionally good grades of paper. There's an Appleton Stack for every supering need, from finishing full paper machine widths to experimental test runs in the laboratory, each built to fit individual requirements and all equipped with the latest Appleton features for fine performance.

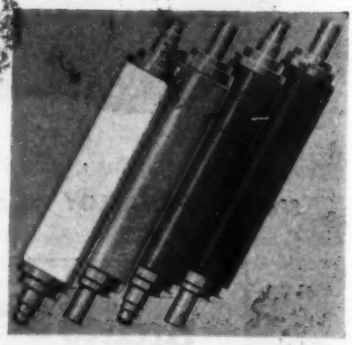


EXPERIMENTAL SUPERCALENDER

COMPLETE SUPERFINISHING EQUIPMENT



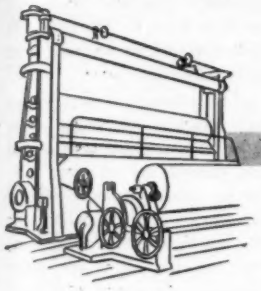
Appleton can furnish everything you need for superfinishing your papers . . . modern high-speed stacks for any application, in any size . . . filled rolls from the most complete selection in America, with standard and special types to give smoothness and finish as required on any grade of paper, at any speed, and on any calender . . . a full line of auxiliary equipment for superfinishing at high speeds, from unwind and windup reels to special roll trucks.



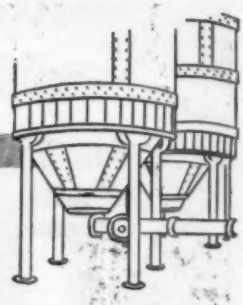
APPLETON

THE APPLETON MACHINE COMPANY · APPLETON · WISCONSIN

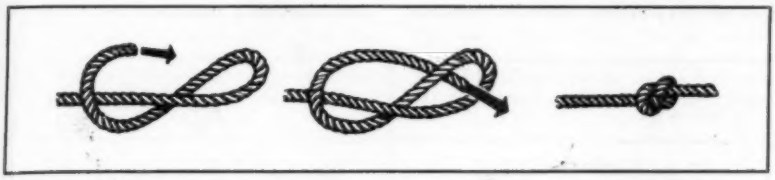
Eastern Sales: CASTLE & OVERTON, Inc., 630 Fifth Avenue, New York • Western Sales: PACIFIC COAST SUPPLY CO., San Francisco • Portland



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.



The Figure Eight Knot

The Figure Eight Knot is the best knot to use to keep the end of a rope or "fall" from running out of a tackle or pulley. To Tie: Make an underhand loop. Bring the end around and over the standing part. Pass the end under, and then up through the loop. Draw up tight.—*Useful Knots and How to Tie Them,* PLYMOUTH CORDAGE COMPANY.

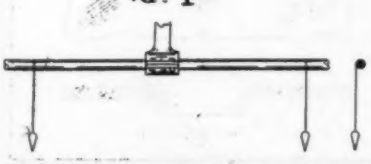
▼

How to Make Certain That Shafting is Perfectly Level and Straight

Figure 1 shows an excellent way in which to align shafting longitudinally. Simply suspend plumbbobs around the side of the shaft, as indicated, all being suspended from the same side. If there are at least three such plumbbobs, it is a simple matter to glance along them and see whether or not the shaft is in alignment. If the plumbbobs are rather far apart you can stretch a thread close to the vertical threads leading to the plumbbobs and you can then measure the misalignment, if you wish, with almost perfect accuracy. The plumbbobs suspended in this way are all perfect tangents to the shaft, and, knowing the diameter of the shaft, there can be no question as to where the center of the shaft is all along the line.

As for aligning shafting vertically, to make sure that it is level, one may use an ordinary garden or other hose filled with water, with gage glasses inserted in the ends, as indicated in Figure 2. No matter how far the ends of this hose are apart, the water will always assume a perfect level and you can be certain as to whether or not the shafting is absolutely level. The only thing to watch out for is: be sure that there is no air in the hose—that it is full of water—and be sure that the temperature of the water is the same from end to end. If one end of the hose is hot and the other end is cold it will not be accurate.—W. F. SCHAPHORST, M. E.

FIG. 1



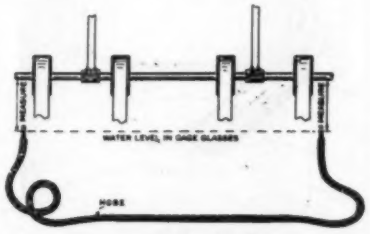
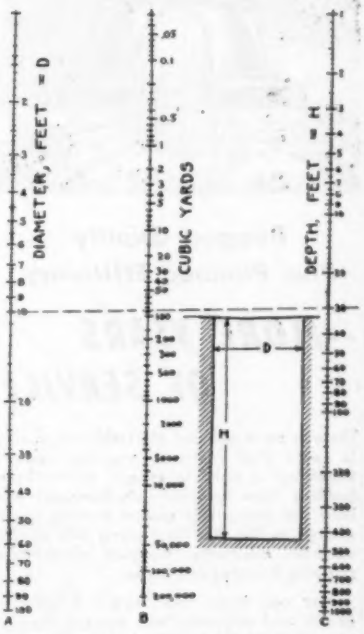


FIG. 2

▼

Chart Quickly Figures Circular Excavations

This chart will be found handy for determining the yardage in circular excavations such as circular pits, cellars, wells, shafts, etc. It gives the amount of space occupied by circular tunnels or sewers or anything of that sort. Its application to circular excavations is practically unlimited. Simply lay a straightedge across the chart and column B immediately gives the yardage.



For example: How many yards must be excavated to make a pit 10 ft. in diameter and 30 ft. deep?

Connect the 10 in column A with the 30 in column C and column B at once shows the yardage to be very close to 87 cubic yards.

The chart will be found to be sufficiently accurate for nearly all work of this nature, and the range of the chart is wide enough to include nearly every size of circular excavation ever made, or likely to be made.—W. F. SCHAPHORST, M. E.

▼

Another Easy Job for Your Blowpipe

Bending and straightening metals depends on the fact that metals expand and contract as the temperature changes. When a section

Toilet Roll and Towel Roll Wrapping Machines

Write for complete information

THE PHOENIX GAGE COMPANY — Phoenix, New York

GEORGE F. HARDY & SON
Mill Architects & Consulting Engineers
441 Lexington Avenue — Established 1900 — New York 17, N.Y.
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DESIGN—COMPLETE PLANS—SUPERVISION

Rugged Quality
Plus Planned Efficiency

--MORE YEARS OF SERVICE

There is more genuine old fashioned quality in Layne Well Water Systems than today's buyer has a right to expect. We've been building them for over sixty-five years and know that every little gadget must be tough enough to last. But right along with quality we have constantly improved efficiency—stepping it higher and higher.

Just put those two factors together—quality and efficiency and demand them in your Well Water System, and you'll end up by owning a Layne.

It isn't as if we had built only a few Layne Well Water Systems that happened to turn out pretty good. For many years we have been building them for a world wide trade: Europe, India, Africa, Indo China, Mexico, Venezuela, South American Countries, Canada and hundreds for the United States.

A lot of cities, railroads and industries of all kinds use Layne Well Water Systems exclusively and will consider no other kind. They seem to know that they are getting a mighty big dollar's worth of real value.

For further information, catalogs, bulletins, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

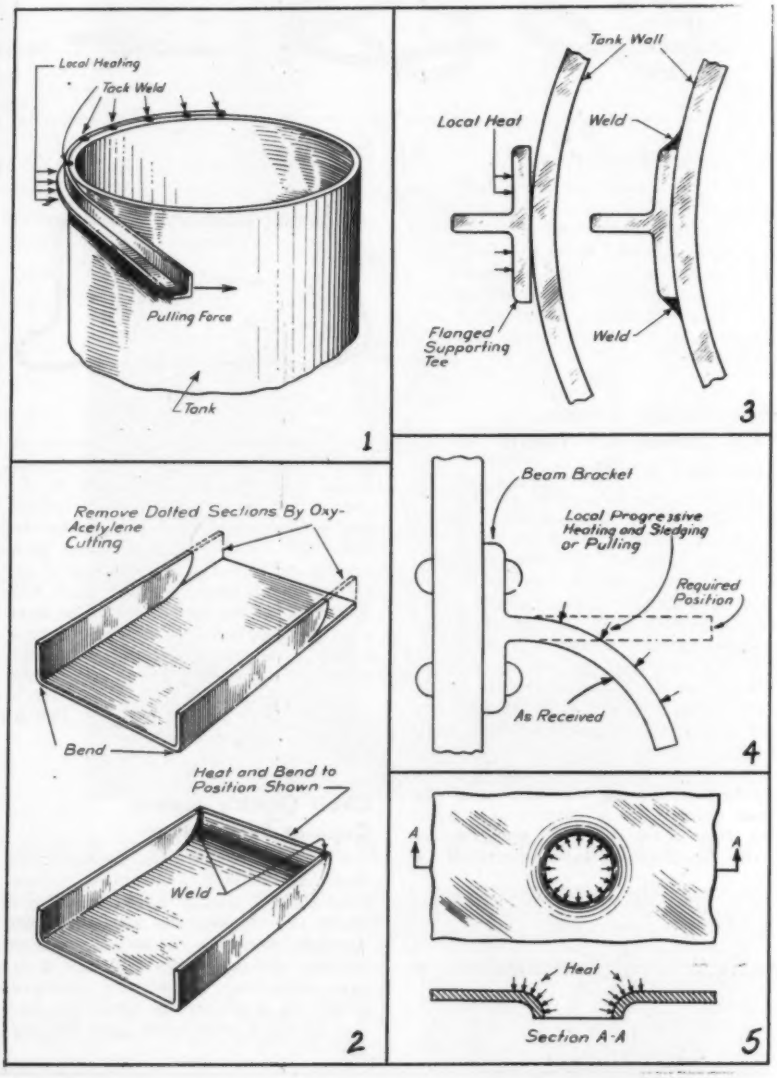
LAYNE
WELL WATER SYSTEMS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne Central Co. Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Wash. * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Minnesota Co., Minneapolis, Minn. * International Water Supply Ltd., London, Ont., Can. * Layne-Hispano Americana, S. A., Mexico, D. F.

is heated it will expand. It will try to contract to its original size and shape when it cools. However, the expansion may be held back by another part of the structure or by the cold metal adjacent to the heated area.

If this happens, the heated metal will upset and become thicker than it was when cold. As the heated area cools, it will try to contract to the original size and shape and will change the shape of the rest of the part. To take full advantage of this property for straightening or bending metal parts you need a quick heat. The heat must be applied rapidly so that the heated area becomes a dull red while the surrounding metal stays cool. The heat should not penetrate more than 1/16 to 1/8 inch. If the heat is allowed to soak in, you will need to apply additional bending power.

You have a fast, economical heat source in your welding blowpipe. You can apply the intense heat just where you need it and you can easily control the amount. The sketches illustrate some common heating jobs. You can learn from them where and how to use the oxy-acetylene heating flame to get the best results. You can adapt these basic operations to almost any bending, straightening, or forming job that comes to the shop.—*Linde Tips*, THE LINDE AIR PRODUCTS COMPANY.



1—This sketch shows how to form and weld angle iron on things like pipe or tanks. Use the same blowpipe and flame adjustment for heating and welding

2—Use your cutting and welding blowpipes to form a shape like this from a piece of sheet steel. It's easy to bend, straighten, or form metals

3—You can form supporting tees to fit the outer wall of a curved part by heating. Then weld it in position with the same blowpipe

4—Heat the arm to a red heat and apply a pulling force to straighten this bracket arm

5—You can form a flange by heating the entire area and then forging it to the shape you want

Nomogram—Power Factor Improvement

What will be the new power factor of your plant when you add another motor?

Knowing any two of the four variables kw, kva, kvar and PF for both original load and added load, you can find final PF by using the diagram this way:

Example 1

A plant carries 790 kw at 1000 kva. *Working in the Plant quadrant, mark point A at the intersection of a vertical from 7.9 on the Original Load kw scale with the 10 Load kva circle.* The synchronous motor to be added is rated 0.8 PF, 90% efficiency, 300 hp. (250 kw). *Working in the Synchronous Motor quadrant, mark point B at the intersection of a vertical from 2.5 on the Added Load kw scale with the 0.8 PF radial line.* What will be final power factor of the plant? *Draw the dashed line from A to B; parallel to it, and through the bull's-eye, draw the other dashed line to solve for 0.92 lagging as final value of Plant power factor.*

Or you can find what the power factor of the added load must be, in order to raise Plant PF to the desired value, like this:

Example 2

A plant carries 790 kw at 1000 kva. *Working in the Plant quadrant, mark point A at the intersection of a vertical from 7.9 on the Original Load kw scale with the 10 Load kva circle.* Final power factor of the plant is to be 0.92. *Working in the Plant quadrant, draw the dashed line through the bull's-eye and 0.92 PF.* What must be the PF of a 300 hp., 90% efficiency synchronous motor? *Parallel with the first dashed line, and through point A, draw another dashed line; where it intersects a vertical from 2.5 Added Load kw in the Synchronous Motor quadrant, mark point B; a radial through B solves for 0.8 PF leading as the required power factor rating of the new motor.*

Other Values

Note in both examples that point A shows original Plant kvar to be 615 (lagging) and that a radial through point A shows original Plant PF to be 0.79 (lagging). Likewise, point B has the four characteristics kw, kva, kvar and PF, any two of which will locate the point.

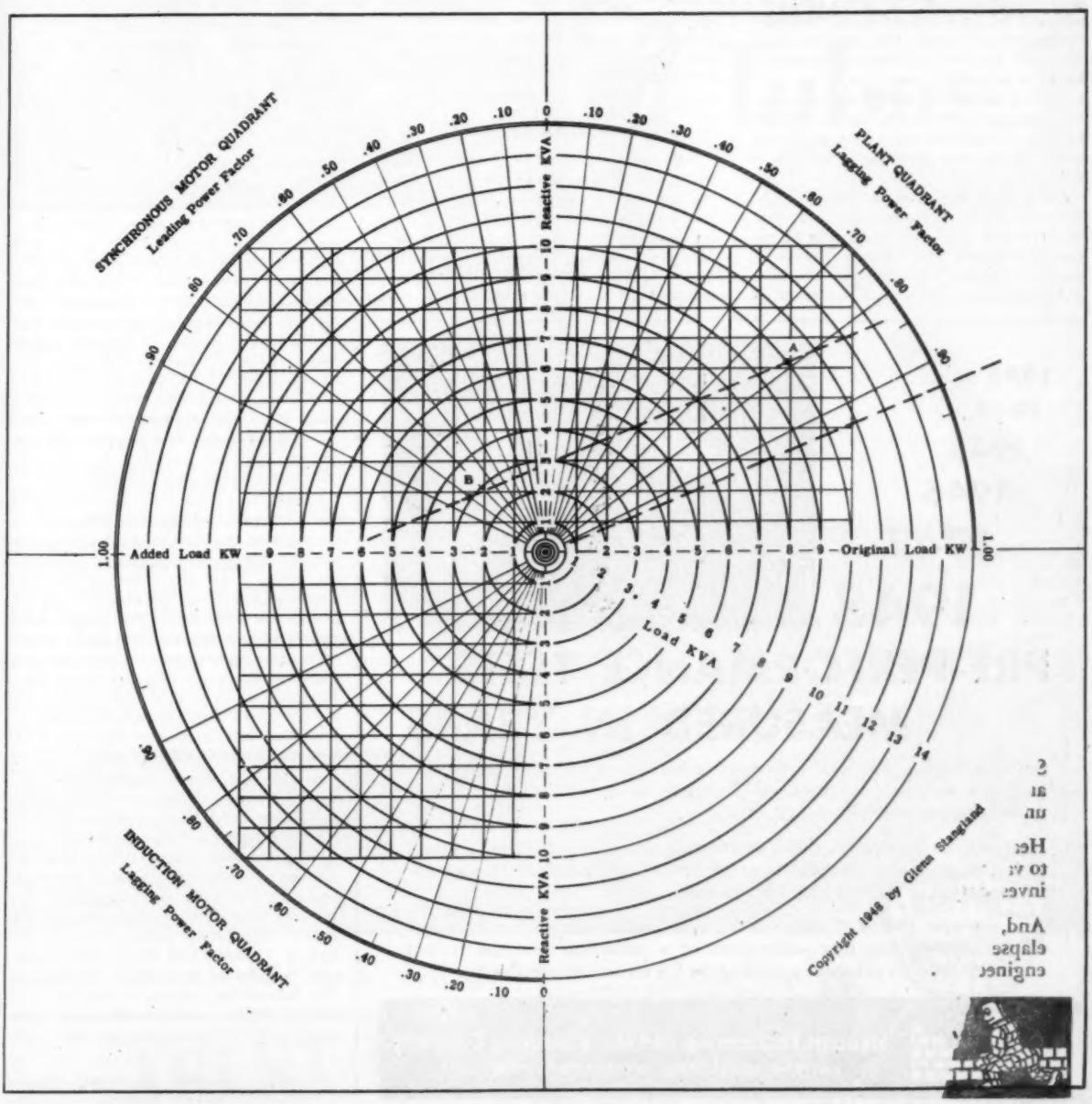
Other Loads

When the added load has lagging power factor, work in the Induction Motor quadrant.

When the added load is a capacitor, work along the upper Reactive kva scale.

When the added load is pure resistance, work along the left-hand kw scale.

—GLENN STANGLAND (Published in *Industry and Power* and *Diesel Progress.*)



World Production of Newsprint Paper—1947*

J. J. ZIMA, Statistician
Newsprint Service Bureau
In co-operation with The Forest Products Branch, O.I.T. U. S. Department of Commerce

▶▶▶ WORLD OUTPUT of newsprint paper in 1947 amounted to approximately 7,650,000 tons and was nearly 570,000 tons greater than in 1946. Also, with the exception of 1937 and 1936, it exceeded that of any other year on record. This statement is based on the results of the second post-war survey of the world newsprint situation undertaken by the Newsprint Service Bureau in co-operation with the Forest Products Branch, O.I.T., United States Department of Commerce.

The process of collecting all available world newsprint data has been a rather lengthy one and coverage is not quite as complete as could be desired due to the refusal of certain countries—which has characterized this type of research as "economic espionage"—to furnish the necessary data. Also, the dearth of information concerning Russia is as great as ever.

Table 1 summarizes newsprint production and consumption position in the United States compared with that of the rest of the world in the two preceding years and in 1939.

From these figures it is seen that the United States in 1947 produced 11 per cent of the world total while consuming 62 per cent of available world supply. Whereas, prior to the war, United States newsprint consumption was below that of the rest of the world combined, this country's usage last year exceeded that of all others by about 1,850,000 tons. It should be remembered, however, that consumption in certain other countries was not as great as it would have been were it not for government imposed restrictions—due largely to monetary difficulties—on the use of newsprint. Of the increase in world supply in 1947 compared with 1946, nearly 460,000 tons or 80 per cent went into United States consumption with the balance of 110,000 tons available to users elsewhere throughout the world.

PRODUCTION

Table 2 lists production of newsprint paper in 1947 by the various countries. As was the case last year, there is again no information regarding Russia and the Soviet Zone in Germany since requests for these data have been refused. The only official figures reported—expressed only as percentages—indicate that output of paper in 1947 was 25 per cent greater than in 1946. Last year it had been estimated, on the basis of the best general information then available, that perhaps 200,000 tons of newsprint had been produced in these areas in 1946 and by applying the reported 25 per cent increase in over-all output of paper to this figure, we arrive at a total of 250,000 tons. Admittedly, this figure represents a good deal of guesswork, but under the circumstances this is unavoidable.

World production of newsprint in 1947 was 8 per cent greater than in 1946 and also exceeded that of 1939 by approximately 1 per cent. North American producers accounted for nearly 370,000 tons or 65 per cent of the increase, while output elsewhere throughout the world was 200,000 tons greater than in 1946. Comparing 1947 with 1939, we find that production on this continent was about 1,530,000 tons greater than in the earlier year, while there was a decline of 1,480,000 tons in the quantity turned out elsewhere.

All producing countries, with the exception of the United Kingdom and Germany (exclusive of the Soviet Zone), reported output equal to or greater than in 1946. Canada's contribution to the increase amounted to 304,000 tons, while that of the United States was 55,000 tons and that of Newfoundland 10,000 tons. Of the European producers of newsprint paper, the largest quantitative increase—70,000 tons—was recorded by France followed by Finland with an increase of 38,000 tons and Belgium with 15,000 tons. There also were increases of 13,000 tons in Austria and 12,000 tons in Sweden. Output in Japan was 16,000 tons or almost 20 per cent greater than in 1946. Production in Brazil, where a new mill came into operation in April of 1947, was double that of the preceding year. The United Kingdom in 1947 turned out 42,000 tons less than in 1946 with production last year equivalent to only one-third of the tonnage made in 1939.

Canada, as has been the case since 1926 when it superseded the United States, continues to be the world's greatest manufacturer of newsprint with output more than five times larger than that of the next largest producer and amounting to 58 per cent of the world total. The United States and Newfoundland follow Canada in the order named as the next most important producers of this grade of paper. The United Kingdom, which in 1946 had ranked as the world's fourth largest manufacturer of newsprint, last year dropped to sixth place, behind Sweden and Finland.

It has been found necessary to revise Table 3 which shows the 12-year world production record of newsprint 1928-1939. Since the report for the year 1946 was issued, it has been definitely determined that the figures previously reported for Japan had been overstated to a considerable degree due to the inclusion of other printing grades. The 12-year average shown in this table is 7,240,000 tons which 1947 production exceeded by more than 400,000 tons. The best production year to date was 1937 when 8,880,000 tons were produced. However, production in that year was abnormally

(*) Based on reports from Foreign Service Officers throughout the World.

1943
1944
1945
1946
1947
1948

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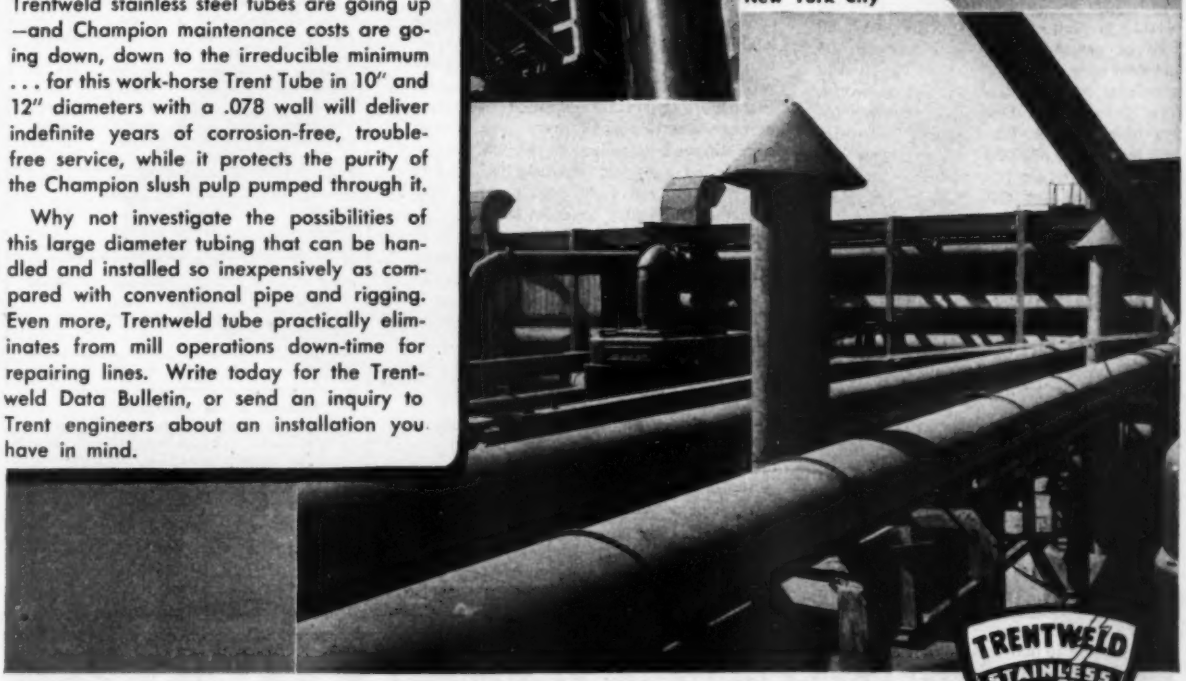

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high due to a considerable extent to the accumulation by newspaper publishers of extraordinarily large stocks which was partly reflected in a 1,400,000 ton decrease in output in 1938.

DISTRIBUTION

Despite the fact that newsprint is an important commodity in world trade, there are only five countries which can be classified as important exporters of this grade of paper. Exports from these countries ranged from more than 4,200,000 tons down to somewhat in excess of 100,000 tons. These countries listed in order of importance are Canada, Newfoundland, Finland, Sweden and Norway. The United States, with exports of only 28,000 tons, was the next largest exporter.

TABLE 1—World Newsprint Production Consumption 1947-1946-1939 (thousand short tons)

	(Thousand Short Tons)						% Change 1947 vs	
Production	1947	%	1946	%	1939	%	1946	1939
United States	826	11	771	11	939	12	+ 7	—12
Rest of World	6,827	89	6,313	89	6,663	88	+ 8	+ 2
World Total	7,653	100	7,084	100	7,602	100	+ 8	+ 1
Consumption								
United States	4,753	62	4,296	61	3,546	47	+11	+34
Rest of World	2,900	38	2,788	39	4,056	53	+ 4	—29
World Total	7,653	100	7,084	100	7,602	100	+ 8	+ 1

Canada

Canada, in keeping with its position as the largest newsprint producer, is also the world's greatest exporter. Of the 4,447,000 tons of newsprint produced last year, 95 per cent or 4,221,000 tons were exported to sixty-nine countries in all parts of the world. The United States always has been the most important market for Canada's newsprint and last year 3,690,000 tons or 87 per cent —a slightly larger proportion of the total than in 1946—of Canadian exports were shipped to this country.

Latin American countries were the destination of 168,000 tons of Canadian newsprint which was 19,000 tons under the quantity exported in 1946, due to a 13,000 ton decrease in shipments to Brazil and 6,000 tons to Mexico. Argentina was the destination of 50,000 tons while 30,000 tons went to Brazil, 22,000 tons to Mexico, 18,000 tons to Cuba and 12,000 tons to Uruguay. Another 18,000 tons was divided almost equally between Chile and Colombia.

Approximately 73,000 tons of newsprint were exported from Canada to Europe with 64,000 tons or 88 per cent of this total going to the United Kingdom, while 6,000 tons went to the Netherlands and 2,000 tons to Greece. Exports to the United Kingdom in 1947 were 29,000 tons or 31 per cent under those in 1946.

A total of 40,000 tons of Canadian newsprint was exported to the African Continent last year with nearly 37,000 tons or 92 per cent going to the Union of South Africa, while less than 2,000 tons went to Egypt. Nearly 39,000 tons of newsprint passed through Canadian ports in 1947 on the way to various Asiatic countries. Of this quantity, nearly 36,000 tons went to China, while shipments destined for India amounted to 16,000 tons. Another 3,000 tons went to British Malaya and somewhat less than that to the Philippines. Following the United States, Australia represented the next largest market for Canadian newsprint with almost 162,000 tons exported there in 1947, while 24,000 tons went to New Zealand.

Newfoundland

Production of newsprint in Newfoundland is almost 100 per cent for export since local consumption is insignificant. Thus we find that 365,000 tons or 98 per cent of the output found its way to other parts of the world. Here also, the major part of the tonnage exported—206,000 tons or 56 per cent—went to the United States. Following in order of importance, 56,000 tons was shipped to the United Kingdom, 31,000 tons to Mexico, 27,000 tons to Australia, 19,000 tons to Argentina, and 16,000 tons to the Union of South Africa. Also 6,000 tons was consigned to New Zealand and not quite 5,000 tons to India. The distribution pattern for Newfoundland newsprint in 1947 was much the same as in 1946 with some changes in quantities exported to certain destinations. Increases over 1946 in tonnage shipped amounted to 14,000 tons to the United Kingdom, nearly 8,000 tons to South Africa and 4,000 tons to New Zealand. On the other hand, 11,000 tons less went to Argentina, 5,000 tons less to Australia and approximately 3,000 tons less to the United States. While small quantities had been exported to France and Egypt in 1946, none was shipped to these countries in 1947.

United States

The United States, dependent as it is on foreign sources for a large proportion of its newsprint supply, exported only 28,000 tons in 1947 which was equal to the tonnage shipped in 1946. These exports represented 3 per cent of domestic production. Approximately one-third or 9,000 tons went to Mexico while the Philippines were the destination of nearly 7,000 tons. To India went 3,000 tons, while a little more than 2,000 tons went to France with slightly smaller quantities going to Cuba and Central American countries.

North American newsprint producing countries taken as a unit exported to all other parts of the world a total of 718,000 tons representing 13 per cent of their production.

Finland

Finland is another country which produces newsprint primarily for export with domestic consumption in 1947 having been limited by law to 26,000 tons or approximately 9 per cent of production. The 272,000 tons of newsprint exported from Finland was even more widely distributed than shipments in 1946. There were, moreover, some pronounced changes in the quantities exported to several countries. The United States, which in 1946 had ranked third in importance—preceded by Russia and Denmark—as a market for Finnish newsprint, last year found itself in first place due to 78,000 tons having been shipped here. This was more than twice the tonnage going to any other destination and three times the quantity exported to this country in 1946. Other substantial increases in exports over 1946 were: to Argentina 23,000 tons, to the United Kingdom 16,000 tons, and to Brazil 10,000 tons. There was, on the other hand, a decrease of 78,000 tons in exports to Russia.

To Europe as a whole went 116,000 tons which included 38,000 tons to Russia, 27,000 tons to Denmark, 24,000 tons to the United Kingdom, and 13,000 tons to Belgium. A total of 60,000 tons of Finnish newsprint was exported to Latin America, of which 37,000 tons went to Argentina and 19,000 tons to Brazil. To all Asiatic destinations went 13,000 tons with India the scheduled recipient of 10,000 tons, while nearly all of the approximately 5,000 tons shipped to Africa were destined for Egypt.

TABLE 2—World Production Newsprint Paper 1947-1946-1939 (short tons)

	(Short Tons)		
Country	1947	1946	1939
Canada	4,447,000	4,143,000	2,869,000
United States	826,000	771,000	939,000
Newfoundland	373,000	363,000	305,000
Sweden	302,000	290,000	305,000
Finland	297,000	259,000	519,000
United Kingdom	288,000	330,000	848,000
France	203,000	133,000	276,000
Norway	124,000	121,000	226,000
Japan	99,000	83,000	306,000
Germany	72,000*	80,000*	415,000
Belgium	50,000	35,000	54,000
Austria	42,000	29,000	25,000
Switzerland	41,000	38,000	40,000
Netherlands	39,000	39,000	104,000
Czechoslovakia	39,000	38,000	24,000
Italy	37,000(?)	32,000	66,000
Australia	36,000	34,000	.....
Poland	35,000	29,000	25,000
Brazil	18,000	9,000	6,000
Spain	16,000	15,000	21,000
Hungary	10,000	4,000	5,000
Chile	6,000	6,000	12,000
Portugal	3,000	3,000	.....
Russia	250,000(a)	200,000(a)	210,000**
Bulgaria	(?)	.....	2,000
Total	7,653,000	7,084,000	7,602,000

* Exclusive of the Soviet Zone.
** Includes Estonia, Latvia and Lithuania.
(a) Estimate for Russia includes Soviet Zone in Germany, Estonia, Latvia, and Lithuania.

Sweden

About 54 per cent of Sweden's 1947 newsprint production was shipped beyond her borders in contrast to 1946 when slightly more than half of her output was retained for home consumption. With more than

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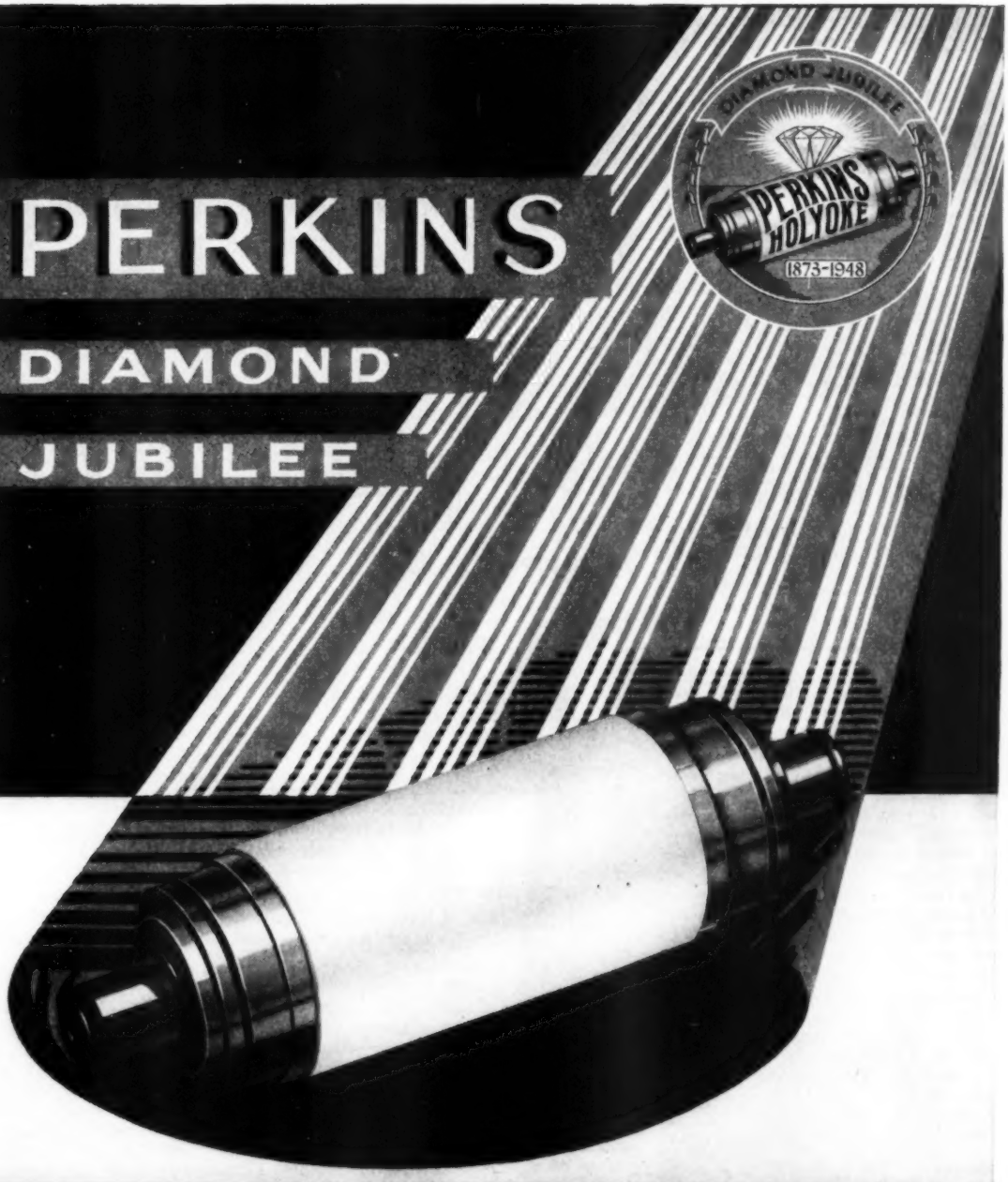

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TABLE 3—World Production of Newsprint Paper—1928-1939 (thousand short tons)

(Thousand Short Tons)

Country	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	12-Year Average
Canada	2,869	2,625	3,648	3,209	2,753	2,599	2,017	1,914	2,221	2,504	2,729	2,381	2,622
United States	939	820	946	921	912	957	946	1,009	1,157	1,282	1,392	1,418	1,058
United Kingdom	848	954	1,033	1,004	970	940	830	790	719	608	637	646	832
Finland	519	457	449	402	329	316	285	254	241	223	217	214	326
Germany	415	512	521	525	464	446	412	450	540	590	623	600	608
Japan	306	324	313	284	278	263	247	218	180	191	213	199	251
Newfoundland	305	268	350	326	336	316	285	254	241	223	217	214	326
Sweden	305	278	303	282	298	272	266	257	265	240	275	234	273
France	276	347	424	331	358	353	335	275	243	240	210	136	294
Norway	226	188	212	200	182	155	167	200	104	202	189	198	185
Russia	200	234	192	217	193	190	135(?)	125(?)	100(?)	90(?)	48(?)	7(?)	144(?)
Netherlands	104	105	106	95	92	92	87	85	79	84	77	76	90
Italy	66	77	66	69	76	68	72	74	69	69	52	45	67
Belgium	54	39	57	53	48	51	39	40	44	50	57	50	49
Switzerland	40	46	50	44	45	39	45	45	49	47	48	40	45
Austria	25	55	62	57	50	50	50	53	62	64	62	57	54
Poland	25	37	44	32	34	32	23	23	27	27	23	20	29
Czechoslovakia	24	48	54	46	41	37	38	40	42	44	47	45	42
Spain	21	21	18	18	42	42	65	65	62	32	30	26	37
Chile	12	12	2	7	6	6	....	....	....	....	....	....	4
Brazil	6	6	8	....	....	....	....	....	....	....	....	....	2
Estonia	6	6	7	7	4	6	6	6	17	29	27	20	12
Hungary	5	5	4	....	....	....	....	....	....	....	....	....	1
Latvia	2	9	8	7	6	5	5	5	3	4	4	3	5
Bulgaria	2	2	1	....	....	....	....	....	....	....	....	....	....
Lithuania	2	2	2	....	....	....	....	....	....	....	....	....	....
Mexico	....	....	....	....	20	20	16	13	15	14	19	17	11
Denmark	....	....	....	....	1	6	7	9	10	10	11	16	6
Total	7,602	7,477	8,880	8,136	7,538	7,261	6,364	6,222	6,544	6,931	7,246	6,679	7,240

50 countries listed as destinations, Sweden's exports amounting to 164,000 tons had world-wide distribution. As in 1946, heaviest shipments went to Argentina with 35,000 tons going there last year, while 28,000 tons went to the United States and 10,000 tons to France. The foregoing are the only countries which took as much as 10,000 tons of Swedish newsprint, while to only 6 other countries quantities of 5,000 tons or more were exported. To India went 9,000 tons, to Brazil 8,000 tons, while 6,000 tons each went to China, Portugal and Cuba, and 5,000 tons were consigned to Uruguay. The balance was made up of small shipments to a numerous list of countries all over the world.

Of Sweden's three largest 1947 customers, only the United States received a larger tonnage—26,000 tons more—than in 1946, while there was a falling-off in shipments to France of 11,000 tons and in those to Argentina of 4,000 tons.

Norway

Norway's newsprint exports in 1947 amounted to 106,000 tons and were about five times apparent domestic consumption. Consumers of newsprint paper in approximately 40 countries throughout the world were dependent on Norwegian newsprint for at least a part of their requirements. The largest quantities exported went to widely scattered destinations with 22,000 tons going to Argentina, 14,000 tons to Denmark, 12,000 tons to India, 9,000 tons to China and 8,000 tons each to the United States and Brazil.

The foregoing discussion covers the most important newsprint exporting countries since only small quantities went beyond the borders of other producing nations. Austria and France are the only other producers known to have exported more than 10,000 tons in 1947. Nearly all of the 18,000 tons exported from Austria went to neighboring European countries, while two-thirds of the 12,000 tons exported by France went to the United States.

▶▶▶ A roundup of all available export data indicates that the United States was the destination of approximately 4,000,000 tons of newsprint with 97 per cent originating in Canada and Newfoundland and the balance coming from 7 European countries.

Latin America

Other Western Hemisphere nations, south of the United States, were the reported destinations of 413,000 tons of newsprint, 237,000 tons of which was shipped by North American producers, while 176,000 tons had its origin in Europe. Compared with 1946, there was a decrease in shipments from North America amounting to 20,000 tons, while exports by European producers increased by 38,000 tons or a net increase of 18,000 tons.

In this area, Argentina was the reported destination of by far the largest quantity of newsprint with a total of 162,000 tons followed by Mexico with 65,000 tons, Brazil 64,000 tons, Cuba 25,000 tons, Chile 20,000 tons and Uruguay 19,000 tons. Shipments totaling 14,000 tons went to Colombia, 11,000 tons to Peru, 9,000 tons to Venezuela and 8,000 tons to the West Indies. Most of the remaining 16,000 tons went to Central America.

Europe

North America last year contributed 132,000 tons toward relieving the reported shortage of newsprint in Europe, 121,000 tons of which was destined for the United Kingdom. Also a total of 212,000 tons produced on that continent found its way to nearby countries. Of the newsprint produced in Europe, 48,000 tons was exported to Denmark, while 38,000 tons went to Russia and 30,000 tons to the United Kingdom. To France went 26,000 tons, to Belgium 21,000 tons, to the Netherlands and Portugal each 11,000 tons and to Greece 10,000 tons.

Africa

Africa was the destination of 71,000 tons of newsprint paper last year compared with 52,000 tons in 1946. Of this total, 82 per cent or 58,000 tons went to the Union of South Africa—about 21,000 tons more than in 1946—while 9,000 tons went to Egypt.

Asia

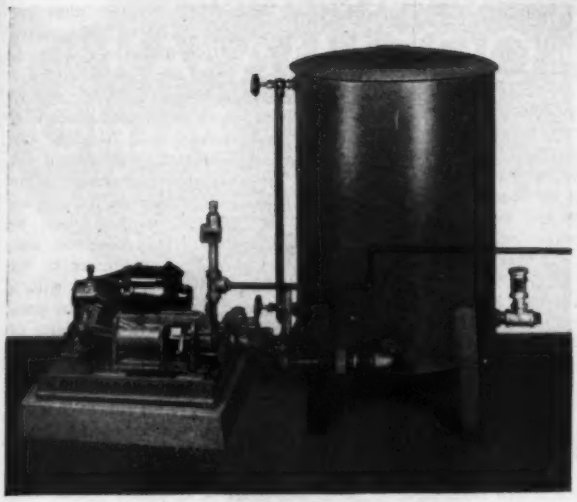
Reported exports to Asia from all sources amounted to 135,000 tons in 1947 and were 30,000 tons greater than in the preceding year. The largest quantity—56,000 tons—went to India, while 54,000 tons was shipped to China and 10,000 tons to the Philippines. Last year's exports to India were 21,000 tons greater than in 1946 and those to China and the Philippines 4,000 tons and 2,000 tons respectively. Total exports to Australia and New Zealand were 219,000 tons or 23,000 tons larger than in 1946.

CONCLUSION

It is evident that there was some narrowing of the gap between world demand and supply of newsprint in 1947 and there is indicated further improvement in that direction in 1948.

There is enough existing machine capacity throughout the world which, if fully utilized, should be sufficient to satisfy prospective world demand. The solution of the present world shortage does not appear to lie so much in the building of numerous additional mills or suggested curtailment of consumption by the world's largest user of newsprint, as in restoring to production, as quickly and as fully as possible, machines now lying idle.

MILTON Roy CHEMICAL PUMPS



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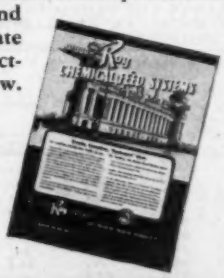

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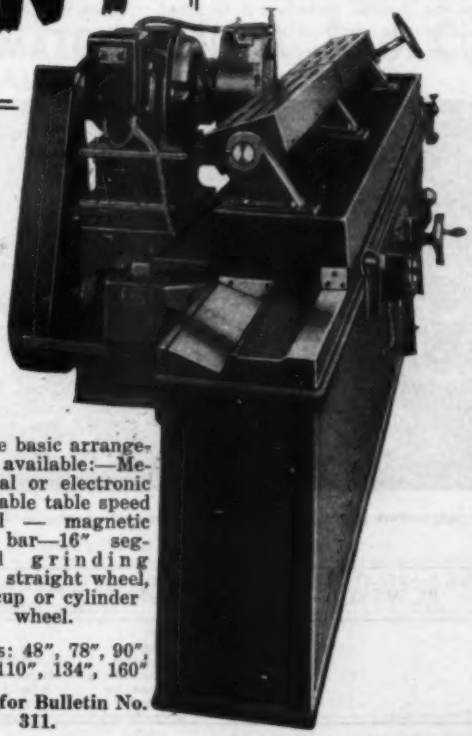

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E. A. BEHR
Chapman Chemical Company

Fiberboards are finding increasingly wider use; with this expanding production, the product will likewise be exposed to new environmental conditions. Insulating boards are not subjected to the hazards of decay, termites, or borers in the same degree as wood since they are rarely used in contact with the soil. Nevertheless, they are largely cellulosic in nature, are usually manufactured from raw materials which are non-resistant to decay and if used in unprotected situations, are likely to deteriorate. In locations in the southern United States, Central and South America attack by fungi and termites is a distinct possibility and some protection for fiberboards to be used in such places is indicated.

Abridgments in this section are from papers presented at the annual meeting of the **Technial Association of the Pulp and Paper Industry** held in New York City, February 23-26, 1948.

Methods of Preventative Evaluation

With the thought in mind of evaluating preservatives for these boards several testing methods have been devised *(1, 2, 3)*. In the assaying of a preservative for fiberboard perhaps the quickest procedure is to resort to the laboratory. Sections of treated board can be placed in glass dishes with a quantity of water to bring about conditions favorable for rot. The board can then be inoculated with some mycelium of a cellulose destroying fungus, allowed to incubate for a period of time, and the loss in weight determined. The greater the weight loss, the poorer the preservative value of the compound tested. A similar method can be used in the laboratory to test termite resistance of the preserved board. Here, however, the effectiveness of the treatment is determined by noting the time necessary to kill the termites or by estimating the amount of damage to the boards after a given period. Laboratory methods are of value in comparing preservatives or eliminating ineffective ones from further study, but it is not easy to predict from laboratory data how well a preserved board will resist destruction of this kind. The details of a method in use for testing for termite resistance are given in the comprehensive work edited by Kofoid *(2)*.

Because of the shortcomings of the laboratory testing methods field exposure plots are frequently used. In most instances, the conditions imposed in the test plots are much more severe than those encountered in actual use. It can, therefore, be fairly safely assumed that any preserved board which resists decay and termites in the field test plots will give a good account of itself when in service in hazardous locations. No standard method of testing fiberboard for decay and termite resistance has been established; consequently, very few tests, when conducted by different workers, will be exactly comparable. This type of test, though, does give a quick answer to the question, "Will this board, treated with a certain amount of the preservative in question, be resistant to biological agencies of deterioration?"

Treatment of Board Samples

The types of preservative and methods of application are discussed in a general way elsewhere (4). Both machine made board and handmade test boards were tested in the exposures to be described below. The boards in the Chapman-Dow tests were prepared as follows: the pulp is prepared in

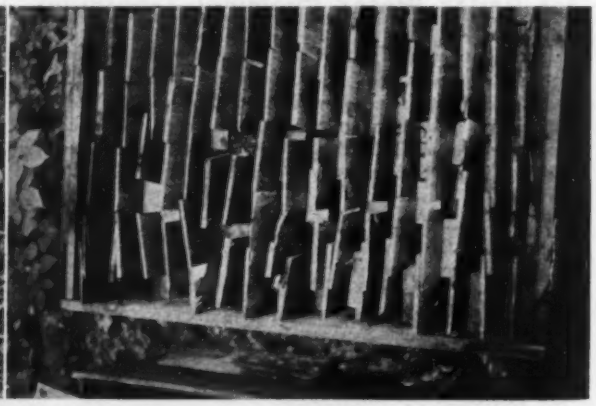

Fig. 1 (left)—Test plot for "partially below ground" samples at Bogalusa, La. . . . Fig. 2 (right)—Top view of box for testing "above ground" samples at Bogalusa, La.

TABLE I.—RELATIVE EFFECTIVENESS OF CERTAIN TOXIC MATERIALS IN THE PROTECTION OF FIBERBOARD AGAINST ATTACK BY DECAY AND TERMITES. SAMPLES WERE INSTALLED AT BOGALUSA, LA., MARCH, 1939, AND DATA IS GIVEN FOR THE APRIL, 1945, INSPECTION

Preservative	Average Retention of Preservative, Per cent by weight of dry board	Specimens Remaining After 72 Months Service	Effectiveness Against Decay — Per Cent Specimens Showing			Effectiveness Against Termite Attack — Per Cent Specimens Showing				
			LD	MD	HD	LST	MST	HST	LIT	MIT
Arsenous oxide	0.70	6	33.3	66.7	...	...	16.7	...	83.3	...
Arsenous oxide	0.73	7	85.7	14.3	...	...	57.1	14.3	28.6	...
Arsenous oxide	1.10	9	33.3	66.7	...	...	33.3	...	66.7	...
Zinc meta-arsenite	0.78	9	87.5	12.5	...	...	22.2	...	77.8	...
Zinc meta-arsenite	0.94	10	40.0	60.0	...	...	...	20.0	70.0	10.0
Pentachlorophenol	0.85	6	...	83.3	16.7	...	16.7	...	83.3	...
Pentachlorophenol	0.98	8	12.5	37.5	62.5	...	...	...	33.3	66.7
Pentachlorophenol	1.08	9	55.5	44.5	...	11.1	11.1	11.1	...	66.7
Zinc pentachlorophenate	0.91	9	...	33.3	66.7	...	...	...	22.2	77.8
Sodium arsenite	Spray app. (amt. unknown)	..	Five specimens destroyed after 21 months; 5 after 47 months.							
Sodium 2-chloroorthophenylphenate	1.3 (superficial)	..	All specimens destroyed after 21 months exposure.							

LD—Light decay
MD—Medium decay
HD—Heavy decay
LST—Light superficial termites
MST—Medium superficial termites
HST—Heavy superficial termites
LIT—Light interior termites
MIT—Medium interior termites

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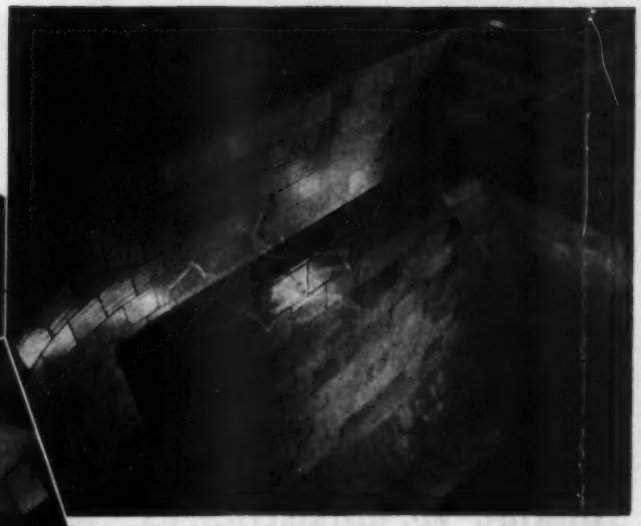

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the usual way from ground wood, waste paper, extracted wood fragments, bagasse, or whatever raw material is favored. If sodium pentachlorophenate is to be used as the preservative, it is added before the rosin size and after the pulp has been thickened. It can diffuse into the pulp fibers and is also absorbed from solution by the pulp, provided the pH is not too acid so as to cause precipitation. Addition of alum lowers the pH and causes precipitation of the sodium pentachlorophenate as pentachlorophenol, which is quite insoluble in water. The bulk of the toxic precipitates in or on the fiber and is not carried away in the drainage water. There is also a certain amount of carrying down of precipitated pentachlorophenol by the fibers. After addition of the water soluble sodium salt of the toxic to the pulp slurry a considerable portion of it remains in solution even though the remaining portion has diffused into the fibers. Accordingly, when the alum is added, the portion previously dissolved in the water of the pulp slurry is precipitated in the bulk of the liquid, but much of it must be retained by the fiber because the losses of toxic are small. About 10% to 15% of the sodium pentacholorophenate added to the thickener chest is not retained.

In most of the field plot tests reported below, the treated board was made on full-size paper making equipment as part of a regular mill run. Sample boards made from hand sheets suffer from the disadvantage that they vary considerably from sheet to sheet and do not represent commercial production very closely, but they are sometimes the only practical type of specimen to use in small scale tests.

Arsenicals vs. Chlorinated Phenols

The board samples of Table I consisted of a 3-ply stake about 1½ by 4 by 12 inches in size. These stakes were buried to half

TABLE II.—SUMMARY OF THE RATINGS MADE ON TERMITE AND DECAY RESISTANCE OF FIBERBOARD MADE FROM GROUNDWOOD PULP OF ASPEN. STAKES INSTALLED PARTIALLY BELOW GROUND IN TEST PLOT AT BOGALUSA, LA., IN DECEMBER, 1938

Preservative Aspen Groundwood	Average Preservation Retention Based on Dry Weight of Board, per cent	Ratings[1] After Different Periods of Exposure in Months — Termites						Decay					
		14 mo.	27 mo.	36 mo.	50 mo.	63 mo.	76 mo.	14 mo.	27 mo.	38 mo.	50 mo.	63 mo.	76 mo.
None		15	0	..	..	..	..	15	0	..	..	..	..
Tetrachlorophenol	0.36	88	45	13	0	..	..	78	18	3	0	..	..
Tetrachlorophenol	0.50	91	80	76	64	0	..	83	60	60	38	0	..
Pentachlorophenol	0.46	93	94	66	25	0	..	88	57	53	15	0	..
Pentachlorophenol	0.95	99	88	88	78	58	40	88	75	70	60	52	38
Pentachlorophenol	0.36[2]	81	88	56	8	0	..	85	52	30	5	0	..
+ borax (50/50)	0.72[2]	99	90	88	76	58	20	97	70	68	48	40	15
Aspen Groundwood with Asphalt													
None		69	57	15	0	..	..	48	15	5	0	..	..
Tetrachlorophenol	0.33	93	99	33	8	8	0	63	25	25	5	5	0
Tetrachlorophenol	0.68	99	85	93	72	52	15	97	60	70	50	42	12
Pentachlorophenol	0.49	100	83	91	75	68	45	100	63	65	52	55	38
Pentachlorophenol	0.82	95	95	93	80	79	76	78	68	75	62	68	62
Pentachlorophenol	0.29[2]	90	93	80	45	30	8	75	65	55	35	25	5
+ borax (50/50)	0.63[2]	97	90	86	72	68	68	100	83	73	73	72	62

(1) Basis of ratings: Termite attack: Sound = 10, LST = 10, MST = 9, HST = 8, MIT = 6, HIT = 4, Destroyed = 0.
Decay: Sound = 10, LD = 8, MD = 4, Destroyed = 0.
Specimens destroyed by termites or decay or both were classfied as 0 in both ratings. The average rating for each set of stakes with the same treatment was multiplied by 10 to give the above ratings.

(2) Retentions for tetrachlorophenol and pentachlorophenol only. The borax retentions were not determined.

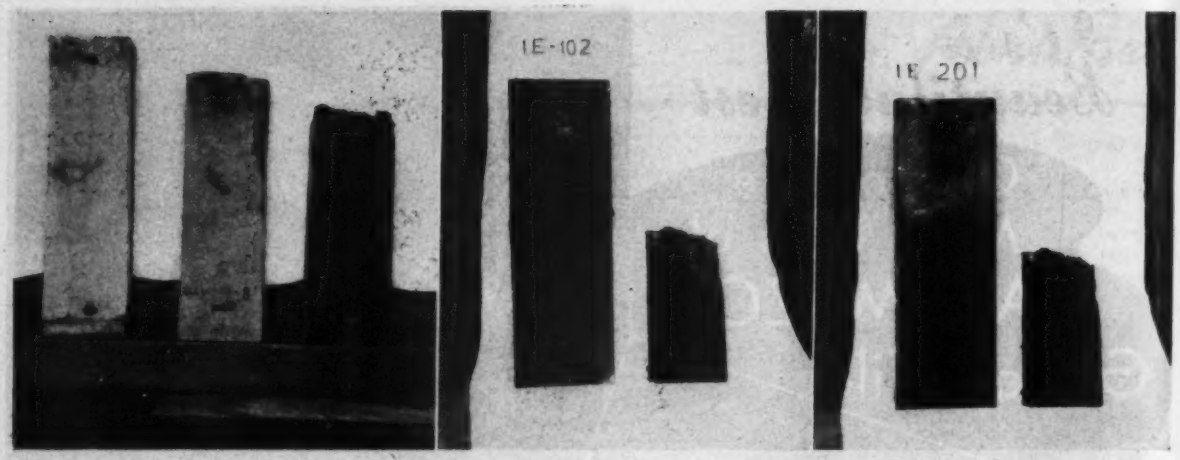

Fig. 3 (left)—Samples from southern pine groundwood stock after 17½ months exposure above ground at Bogalousa, La. Treatments as follows: L., 0.8 per cent copper pentachlorophenate, C., 0.8 per cent pentachlorophenol, R., control untreated. . . . Fig. 4 (center)—Board of aspen groundwood treated with 0.4 per cent copper pentachlorophenate on left and untreated control, after 17½ months in "partially below ground" location at Bogalusa, La. . . . Fig. 5 (right)—Board of aspen groundwood treated with 0.6 per cent copper pentachlorophenate on left and untreated control on right after 17½ months exposure in "partially below ground" location at Bogalusa, La.

their length in the ground in the test pots. This type of test is exceptionally severe since ideal moisture and nutrient conditions are frequently present for decay fungi and termites have ready access to the board. Fiberboards are almost never used in this type of exposure, so such test results are not easy to use to predict service life. However, weak treatments will show up in a test of this sort in a short period of time. The data of this table attempt to compare the relative effectiveness of the chlorinated phenols with the arsenicals, and superficial treatments with treatments made during the manufacturing process.

It is not safe to say, on the basis of this single test, that the arsenicals do a better protecting job than do the chlorinated phenols. The results appear to be rather inconsistent; for example, those specimens treated with 1.08% pentachlorophenol (actually treated with the sodium salt of pentachlorophenol, but this exists on the fiber in the preciptated form, pentachlorophenol) appear to have resisted decay and termites considerably better than this 10% increase in concentration over those treated with 0.98% would warrant. Untreated controls in this location will last about 18 months; accordingly, those treatments listed which were applied by manufacturing methods all substantially increase the length of life of the board. The arsenicals, although offering good protection, are shunned by some manufacturers because of the possibilities of stream pollution and the accompanying devastation to plant and animal life in these waters into which the board mill waste is thrown. There is also the possibility of the release of arsine or other dangerous volatile arsenic compounds by the action of certain fungi *(5)* on the treated board after its installation. Although no boards treated with sodium arsenite or sodium-2-chlorothophenylphenate by methods other than surface treatment were included in this test, it can be concluded that treatment during the pulp stage is more effective than a spray application to the finished board. Some of the compounds listed in Table I, applied to the pulp, have about the same range in toxicity as the two applied by spraying, but considerable more protection was given.

TABLE III.—COMPARISON OF TREATED FIBERBOARD SPECIMENS MADE FROM ASPEN WHEN INSTALLED ABOVE AND PARTIALLY BELOW GROUND. SPECIMENS WERE 12-INCH SQUARES AND WERE INSTALLED IN TEST PLOTS AT BOGALUSA, LA., DURING FEBRUARY, 1937

Preservative	No. of Specimens	Average Preservative Retention Based on Dry Weight of Board, %	Condition Rating Against Decay Inspection on April, 1945	
			Above ground	Below ground
Control	10	...	46	40
Tetrachlorophenol	10	0.22	56	43
Tetrachlorophenol	10	0.30	52	43
Tetrachlorophenol	10	0.58	62	50
Tetrachlorophenol	10	1.59	78	64
Pentachlorophenol	10	0.17	62	46
Pentachlorophenol	10	0.38	70	55
Pentachlorophenol	10	0.80	70	62

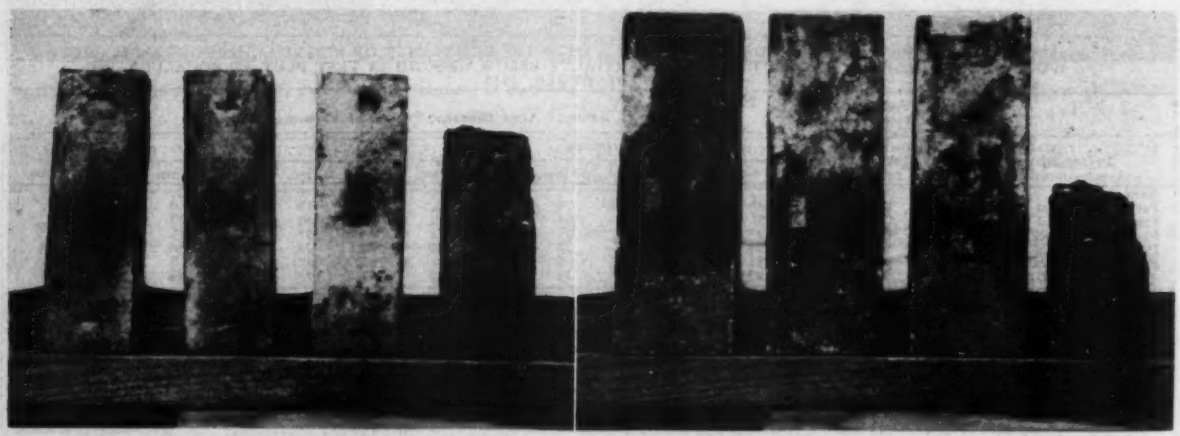

Fig. 6 (left)—Board samples made of southern pine groundwood after "partially below ground" exposure at Bogalusa, La., for 17½ months. Treatment from left to right: 0.8 per cent pentachlorophenol, 0.6 per cent pentachlorophenate, 0.4 per cent copper pentachlorophenate, untreated control. . . . Fig. 7 (right)—Board samples made of aspen groundwood after "partially below ground" exposure at Bogalusa, La., for 17½ months. Treatments from left to right: 0.8 per cent pentachlorophenol, 0.4 per cent copper pentachlorophenate, 0.4 per cent copper pentachlorophenate, untreated control

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Results of Test Plot Data for Pentachlorophenol

The data presented in Table II give a picture of the comparative effectiveness of tetrachlorophenol and pentachlorophenol, when added to the pulp slurry as the sodium salts, in prevention of decay and termite attack on two types of fiberboards. The test plot at Bogalusa, Louisiana, is located on a gently sloping site at the edge of a stand of mixed hardwoods, where decay fungi are especially active and termites are plentiful.

Rainfall averages about 58 inches per year, keeping the soil and surroundings moist enough for both fungi and termites to be in their most active state. Since these samples were partially buried, their life is considerably shorter than it would be if they were in the normal severe exposure as part of a building. Figure 1 shows the fiberboard stake plot where the samples are partially buried. The stakes reported on in Table II were composed of three layers of fiberboard stapled together to make one specimen 1½ by 4 by 12 inches in size. The ground cover together with the shade from the overstory of trees and tall shrubs helps maintain the humidity at a high level in those tests where no artificial covering over the test stakes was used. Pentachlorophenol appears to be somewhat better than tetrachlorophenol as a preservative when both are used in equivalent amounts. For good protection against decay and termites it appears that from 0.75% to 1.0% of pentachlorophenol, based on the dry weight of the board should be used; however, concentrations of these toxics only one-half as large will provide considerable rotection. The addition of borax to the treating solution had no effect on its preservative value against decay and termites. This salt is used in sap stain control chemicals because it helps keep the sodium pentachlorophenate in solution and helps control certain mold and stain fungi, but these contributions seem to be of little use in fiberboard preservation.

An attempt is made in Table III to compare the resistance to decay of treated fiberboard made from aspen in two different exposures. It is quite apparent that the partially below ground exposure is more severe than the above ground location for both tetrachlorophenol and pentachlorophenol. All test samples were 12-inch squares. The "above ground samples" were stacked vertically with one edge in contact with the ground and covered over to protect them from the weather. Those specimens designated as "partially below ground" were placed in a trench 6 inches deep and 12 inches wide so that bottom edges and halfway up the sides were in contact with the ground. These specimens also were covered over to protect them

TABLE IV.—COMPARISON OF PRESERVATIVE EFFECTIVENESS OF SODIUM PENTACHLOROPHENATE ON FIBERBOARDS OF DIFFERING RAW MATERIAL SOURCE WHEN INSTALLED ABOVE GROUND IN TEST PLOT AT BOGALUSA, LOUISIANA

Type of Board	No. of Specimens	Average Preservative Retention Based on Dry Weight of Board, %	Date Installed	Condition Rating for Decay Resistance After Number of Months Shown								
				47	63	68	70	72	75	93	95	96
Waste paper	10	0.44	May, 1937	..	..	..	96	..	..	..	76	..
Waste paper	10	0.93	May, 1937	..	..	..	98	..	..	..	80	..
Waste paper	10	Control	May, 1937	..	..	..	78	..	..	..	38	..
Cane fiber	10	0.2	July, 1937	..	..	76	..	..	..	68	..	..
Cane fiber	10	0.55	July, 1937	..	..	80	..	..	..	74	..	..
Cane fiber	10	Control	July, 1937	..	..	72	..	..	..	36	..	..
Southern pine groundwood	9	0.5-0.8	Dec., 1938	..	80	..	..	..	75	..	..	..
Southern pine groundwood	9	Control	Dec., 1938	..	40	..	..	..	22	..	..	..
British board	7	0.34	March, 1939	74	..	..	..	..	..	..	..	..
British board	7	0.56	March, 1939	80	..	..	..	..	..	..	..	..
British board	7	Control	March, 1939	60	..	..	..	..	..	..	..	..
Aspen groundwood	10	0.38	Feb., 1937	..	..	..	..	78	..	..	..	70
Aspen groundwood	10	0.80	Feb., 1937	..	..	..	..	80	..	..	..	72
Aspen groundwood	10	Control	Feb., 1937	..	..	..	..	70	..	..	..	57

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from the weather. No termite resistance ratings are given here because they were not considered accurate. Each year the specimens are removed for examination and the surface dirt, roots, and fungus mycelium removed, which often disturbs the termite damage, tunnels, shelter tubes, etc. After four or five such removals it becomes difficult, if not impossible to judge the amount and type of termite damage.

Since fiber insulating boards are manufactured from a wide variety of raw materials there is a possibility that the nature of the fiber source could play some role in possible resistance of the board when exposed to the various agencies of deterioration. In Table IV are given the decay ratings, after certain periods of exposure of boards, treated with sodium pentachlorophenate in the pulp slurry. Of the rather wide range of fibrous material sources tested, none seem to be very resistant to decay when exposed untreated. The board made from aspen groundwood seems to have stood up best of the group which were tested in the untreated form. No explanation can be offered for this phenomenon since the complete past history of the pulp sources, pulp, and processing techniques for each type of board under test was not known. With the subjective method of evaluating the decay resistance of the fiberboard test stakes it is not possible to use statistical analysis on the results. Accordingly it can not be stated with certainty, for example, that the board made from waste paper lends itself more readily to protection from this treatment than does cane fiber board. It would seem then, that treatment of the pulp slurry with sodium pentachlorophenate offers about equal protection to the board no matter whether its base material

TABLE V.—RESULTS OF THE 1947 INSPECTION OF SAMPLES OF FIBERBOARD FROM VARIOUS SOURCES TREATED WITH PENTACHLOROPHENOL AND COPPER PENTACHLOROPHENATE AND INSTALLED ABOVE AND BELOW GROUND IN TEST PLOTS AT BOGALUSA, LA., AND JACKSONVILLE, FLA., ON MAY 30, 1946, AND JULY 9, 1946, RESPECTIVELY

Board Source	Toxic	Concentration Toxic Added to Stock, %	No. of Specimens	Site	Location	Ratings—Nov. 6, 1947 Termites	Decay
Southern pine groundwood A	Copper pentachlorophenate	0.4	5	Above ground	Bogalusa	92	96
Southern pine groundwood A	Copper pentachlorophenate	0.6	5	Above ground	Bogalusa	100	98
Southern pine groundwood A	Copper pentachlorophenate	0.8	5	Above ground	Bogalusa	100	98
Southern pine groundwood A	Copper pentachlorophenate	1.0	5	Above ground	Bogalusa	100	99
Southern pine groundwood A	.....	Control	3	Above ground	Bogalusa	40	47
Southern pine groundwood B	Copper pentachlorophenate	0.4	10	Above ground	Bogalusa	100	92
Southern pine groundwood B	Copper pentachlorophenate	0.6	10	Above ground	Bogalusa	99	94
Southern pine groundwood B	Pentachlorophenol	0.8	10	Above ground	Bogalusa	98	66
Southern pine groundwood B	.....	Control	10	Above ground	Bogalusa	39	28
		(hand sheet machine)	10				
Southern pine groundwood B	.....	Control	10	Above ground	Bogalusa	36	31
		(hand sheet machine)	10				
Southern pine groundwood B	Copper pentachlorophenate	0.4	8	Below ground [1]	Bogalusa	100	80
Southern pine groundwood B	Copper pentachlorophenate	0.6	10	Below ground [1]	Bogalusa	100	84
Southern pine groundwood B	Pentachlorophenol	0.8	9	Below ground [1]	Bogalusa	98	71
Southern pine groundwood B	.....	Control	10	Below ground [1]	Bogalusa	0	0
		(hand sheet machine)	10				
Southern pine groundwood B	.....	Control	10	Below ground [1]	Bogalusa	0	0
		(hand sheet machine)	10				
Waste paper	Copper pentachlorophenate	0.2	10	Above ground	Bogalusa	100	94
Waste paper	Copper pentachlorophenate	0.4	10	Above ground	Bogalusa	100	88
Waste paper	Copper pentachlorophenate	0.6	10	Above ground	Bogalusa	100	94
Waste paper	Pentachlorophenol	0.8	10	Above ground	Bogalusa	100	86
Waste paper	.....	Control	10	Above ground	Bogalusa	79	66
Aspen groundwood	Copper pentachlorophenate	0.4	10	Above ground	Bogalusa	98	82
Aspen groundwood	Copper pentachlorophenate	0.4	10	Above ground	Jacksonville	98	84
Aspen groundwood	Copper pentachlorophenate	0.6	10	Above ground	Bogalusa	100	78
Aspen groundwood	Copper pentachlorophenate	0.6	10	Above ground	Jacksonville	100	94
Aspen groundwood	Pentachlorophenol	0.8	10	Above ground	Bogalusa	88	76
Aspen groundwood	Pentachlorophenol	0.8	10	Above ground	Jacksonville	99	76
Aspen groundwood	Copper pentachlorophenate	0.4	10	Below ground	Bogalusa	91	56
Aspen groundwood	Copper pentachlorophenate	0.4	10	Below ground	Jacksonville	91	64
Aspen groundwood	Copper pentachlorophenate	0.6	9	Below ground	Bogalusa	100	84
Aspen groundwood	Copper pentachlorophenate	0.6	9	Below ground	Jacksonville	98	91
Aspen groundwood	Pentachlorophenol	0.8	10	Below ground	Bogalusa	80	56
Aspen groundwood	Pentachlorophenol	0.8	9	Below ground	Jacksonville	60	58
Western softwood groundwood	Pentachlorophenol	0.25	1	Above ground	Bogalusa	100	80
Western softwood groundwood	Pentachlorophenol	0.25	1	Above ground	Jacksonville	60	60
Western softwood groundwood	Pentachlorophenol	0.50	1	Above ground	Bogalusa	100	100
Western softwood groundwood	Pentachlorophenol	0.50	1	Above ground	Jacksonville	90	60
Western softwood groundwood	Pentachlorophenol	0.75	1	Above ground	Bogalusa	100	80
Western softwood groundwood	Pentachlorophenol	0.75	1	Above ground	Jacksonville	100	80
Western softwood groundwood	Pentachlorophenol	1.00	1	Above ground	Bogalusa	100	80
Western softwood groundwood	Pentachlorophenol	1.00	1	Above ground	Jacksonville	100	80
Western softwood groundwood	Pentachlorophenol	Control	1	Above ground	Bogalusa	60	60
Western softwood groundwood	Pentachlorophenol	Control	1	Above ground	Jacksonville		80

(1) Installed in block form.

is waste paper, cane fiber, southern pine groundwood, British groundwood, or aspen groundwood.

Effectiveness of Copper Pentachlorophenate

The most recent series of tests have been concerned with the preservative qualities of copper pentachlorophenate. The test samples were installed in three ways: as three-ply stakes buried to one-half their length in the soil and separated from all other stakes, as three-ply stakes buried one-half their length in soil but located in blocks of ten samples installed as a unit, and as three-ply stakes set vertically in an open-bottom box with each row of stakes separated by untreated pine boards. In Figure 1 can be seen the methods of installation of the below ground specimens, and Figure 2 shows the above ground installation method with the cover of boards removed from the enclosing box.

The method of preparation of the samples was the same as for tests described previously, but before addition of the alum to the pulp-size-sodium pentachlorophenate mixture, a copper sulphate solution is added to precipitate the sodium pentachlorophenate, on and in the fiber, as copper pentachlorophenate instead of pentachlorophenol. When using copper sulphate, it is considered advisable to use the minimum of alum necessary to secure satisfactory recovery of solids because a highly acid medium may cause the loosening or stripping of the copper salt from the fibers. For each pound of sodium pentachlorophenate added to the pulp a theoretical amount of 0.4 of a pound of copper sulphate pentahydrate would be sufficient to precipitate the sodium pentachlorophenate. However, since the latter is the more expensive reagent, it is best to add double the theoretical amount of copper sulphate to be sure of precipitation of all the sodium pentachlorophenate.

The data given in Table V summarize the inspection results on fiberboard stakes treated with pentachlorophenol or copper pentachlorophenate and installed in test plots at Bogalusa and Jacksonville. It is evident that in the 17 months the board samples have been under test that copper pentachlorophenate is a better preservative for fiberboard than when sodium pentachlorophenate is precipitated with alum on to the board. The same can be said for the below ground test samples except that boards treated with both types of preservatives were attacked more by decay and termites than the above ground samples. The control samples of all types of board were attacked by both termites and decay fungi, but the board made from a waste paper pulp source seemed somewhat more resistant in this test. Both treatments are especially effective against termites; against decay the copper precipitate shows up the better. It can also be seen that the Bogalusa plot imposes more severe decay conditions than the Jacksonville plot. Figure 3 shows samples of boards made from southern pine groundwood; the board on the left was treated with 0.8% copper pentachlorophenate and shows no decay; the middle sample was treated with 0.8% pentachlorophenol and shows some slight decay where it was in contact with the ground; the last is an untreated sample which has lost about an inch of material from decay. The first board appeared to be unusually well sized with the result that it shed water well and was not as susceptible to decay as certain other manufacturers' board. This particular sample is designated as "Southern Pine Groundwood A" in Table V. These samples were all tested above ground.

Figures 4 and 5 show samples of aspen groundwood tested with 0.4% and 0.6% copper pentachlorophenate respectively and exposed in below ground locations at Bogalusa. The untreated control samples have been destroyed for their whole below ground portion. The board treated with 0.6% copper pentachlorophenate is still in excellent condition despite the severe exposure. In Figure 6 the two types and concentrations of preservatives used in the test are shown after exposure below ground. Figure 7 shows the aspen groundwood boards treated with what are probably equivalent treatments after below ground exposure.

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Answer to question No. 9

In 1793 in Kentucky

Rag Mill Refining

H. P. ESPENMILLER
Res. Engineer, Dilts Machine Works
Div. of Black-Clawson Co., Inc.

Prior to 1860, rag fibres, together with a small amount of straw, jute and hemp, were the only papermaking raw materials available, and all grades from news to writing papers were made from these fibers.

About that same time, the Hollander beater was brought into general use and its introduction brought about the first major change in papermaking equipment with attendant improved quality and increased production. More than a century has passed since the introduction of the Hollander beater in this country, but basically, the method of preparing rag fibres for the manufacture of high quality papers, for the most part, has remained unchanged. Of course, there have been improvements made on the beater and other equipment used but the type of equipment is essentially the same.

Normally, the rag pulp or half-stuff is furnished to finishing beaters where it is reduced in fiber length and hydrated to the degree required for the type of paper being made. During present rag mill refining processes, this is a long and tedious procedure requiring from 4 to 24 hours of beating, depending upon the type and quality of the half stuff. Such lengthy processing not only limits production capacity but increases operating costs, consequently, the purchase price of the finished papers.

Recent work, however, indicates that modern equipment is now available, which may replace in part or wholly, the rag finishing beater producing better paper at remarkable power savings (up to 60%) while reducing batch refining time by as much as 75%. These major savings have been made possible by the proper application with modifications of a high speed refiner, known throughout the industry as the Hydrafiner.

Typical strength development characteristics for any stock prepared by this equipment in systematic and progressive stages are illustrated in Figure 1. Note that units of strength development are plotted against units of applied power to illustrate the type and degree of refining that may be expected during the stock preparation procedure using Hydrafiners and jordans. In the refiner range, observe the characteristic flatness of the freeness curve. Bursting strength and shrinkage show a considerable increase which, as previous work has shown, may be attirbuted to the splitting and flatting or bruising of the individual fibers to produce with a minimum amount of cutting what is commonly termed hydration or wet feel. In other words, the strength characteristics of the pulp have been developed to a point where the jordans may take over to complete the final phase of cutting and additional hydration to the degree required for optimum strength development and paper machine operation. The slope of the curve shown in Figure 1 will vary depending upon the type of pulp being processed, but the general trend of strength development during refiner-jordan operation is well illustrated.

These same principles have now been applied to the preparation of rag half stock for the manufacture of high quality papers. However, since prebeaten half rag stuff is considerably longer than wood pulp fibers, it was found necessary to modify the design of the refiner liners in such a manner that both the neeessary amount of cutting and hydration could be obtained.

During the course of planning the modernization of a prominent rag paper mill, the management exhibited great interest and desire for new and modern equipment which would supplement or replace the rag stock

TABLE 1—Preliminary Field Trials—Refining Rag Stock

Test Series	Furnish	Beater Treatment, hr.	Refiner Treatment, min.	Horsepower per Ton per Day		Freeness, Canadian Standard, ml.	% Retention 20-Mesh	Remarks
				Beater	Refiner			
1	100% No. 1 rags	6.5	0	37.0	0	409	51.3	Plug bars standard
			10	37.0	3.7	359	49.3	
			35	37.0	12.8	317	54.9	
2	50% rags	4.0	0	22.8	0	611	66.2	Plug bars narrowed 3/16 inch
			20	22.8	7.8	511	61.2	
	50% sulphite	4.0	0	22.8	0	579	59.8	Inlet valve 60% closed
			25	22.8	9.6	423	48.3	
3	100% (No. 1) rags	9.5	0	54.0	0	263	36.6	Completely beater treated stock
	100% (No. 1) rags	3.0	0	17.0	0	522	67.3	Discharge throttled 75%
			30	17.0	11.7	425	55.4	
	100% (No. 1) rags	2.5	0	14.2	0	672	73.0	Discharge throttled 75%
			10	14.2	3.6	620	66.8	
			32	14.2	11.4	542	60.0	

TABLE 2—Final Trials—Refining Rag Stock

Test Series	Furnish	Beater Treatment, hr.	Refiner Treatment, min.	Horsepower per Ton per Day			Freeness, Canadian Standard, ml.	% Retention 20-Mesh	Remarks
				Beater	Refiner	Total			
4	100% rag (No. 1)	12	0	68.2	0	68.2	275	24.0	Completely beater treated stock
	100% rag (No. 1)	2.5	0	14.2	0	14.2	630	71.2	Refiner with redesigned liners.
			15	14.2	5.3	19.6	521	55.8	Discharge not throttled
			29	14.2	10.2	24.4	445	47.1	
	100% rag (No. 1)	2.75	0	15.6	0	15.6	585	67.8	
			35	15.6	12.5	28.1	344	42.7	
5	100% rag (No. 1)	12	0	68.2	0	68.2	...	...	Comp. beater treated stock
	100% rag (No. 1)	3	0	17.0	0	17.0	537	79.3	Refiner with redesigned liners.
			5	17.0	1.8	18.8	489	62.1	Discharge throttled 60%
			16	17.0	5.8	22.8	431	...	
			25	17.0	8.9	25.9	375	61.9	

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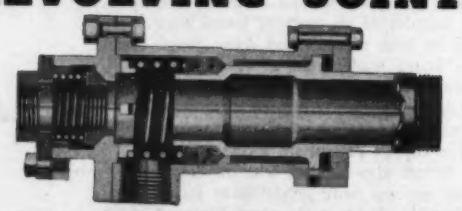

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finishing beaters and cut down both the time and power required for treating high grade rag stock for the manufacture of bond, ledger and banknote papers. The Hydrafiner appeared to be the logical piece of equipment to employ for this purpose since it was originally designed for the express purpose of replacing the beaters and performing beater functions with greater efficiency. Accordingly, a standard 1200 rpm, No. 1 unit was installed for this work. It was driven by a 250 hp. motor direct connected and was equipped with a standard 68-bar herringbone shell liner and a special 26-bar plug. All sharp edges leading into the stock were ground off to prevent entanglement of the long fibered rag stock in order to avoid dewatering in the Hydrafiner due to hang-up of long fibers on projecting edges.

At the present time, this mill employs a total of 21 beaters and washers. The grades manufactured are of a very high quality consisting of bond, ledger, and banknote papers, all of which have a rag content of at least 50%. An extensive expansion program is now under way with plans to replace one of the smaller paper machines and another machine will be completely rebuilt. In order to increase half stuff preparation capacity, a new large rag boiler has been installed which will furnish by gravity a new washer beater equipped with two rolls and two washing cylinders. The unit is of the latest design, one of the largest of its type in existence, and will both wash the rags and reduce them to the equivalent of three hours treatment in a finishing beater. Under these conditions, it is imperative, in order to increase production and retain quality that a most efficient and modern refining engine be used directly after the washer-beater in place of the existing finishing beaters. This plan obviates the need for drainers and represents a most "forward-looking" approach to rag mill stock preparation.

Operational Procedure and Results

A diagrammatic sketch of the mill layout showing the refiner hookup is shown in Figure 3. The refiner was installed in the basement and piping was arranged so that prebeaten stock could drop directly to the inlet of the refiner, pass through the unit and be discharged by the pumping action of the refiner back into the same beater, circulated by the roll and boarded off to prevent bypassing. In this manner, the beater became a cycling chest and is typical of some of the very first installations used for chemical pulp. Another line was installed on an adjacent beater so that two batches of prebeaten stock could be refined consecutively thereby making it possible to run 100% refiner prepared stock on the paper machine.

Since there are always numerous failures in any venture of this type before success is achieved, it is necessary to enumerate the failures in order to clearly portray in logical sequence the steps leading to the successful culmination of this work and the changes made to achieve this success.

Test Series No. 1

Three series of preliminary trials were made and the data obtained from these experiments is shown in Table 1. In the first attempt to refine rag stock, a batch of high grade rags which would normally receive a 12-hour beat were processed for 6½ hours. The roll was raised and the prebeaten stock was refined for a total of 35 minutes at a motor load of 292 hp. The resulting stock was unsatisfactory since not enough cutting had been accomplished. When the stock reached the machine, it gave the characteristic formation of a long fiber, i.e., an indistinct water mark and a mottled formation. These observations were borne out by test data from samples taken during the operation, wherein it can be seen that no decrease occurred in the percentage of stock retained on a 20-mesh screen, although the freeness dropped from a Canadian Standard value of 409 to 317 ml. In order to be sure that the data obtained in this test were correct, the run was repeated and confirming results were obtained.

It was obvious from the results of the first trials, that a change had to be made which would increase the cutting ability of the refiner without sacrifice of hydration. It was decided to decrease the width of each bar on the plug by 3/16 inch, thereby reducing the bar face area about 30%.

Test Series No. 2

With the narrow plug bars, the first two refining trials were made on a furnish of 50% rag stock which normally received a 7-hour beat, and 50% Weyerhaeuser sul-

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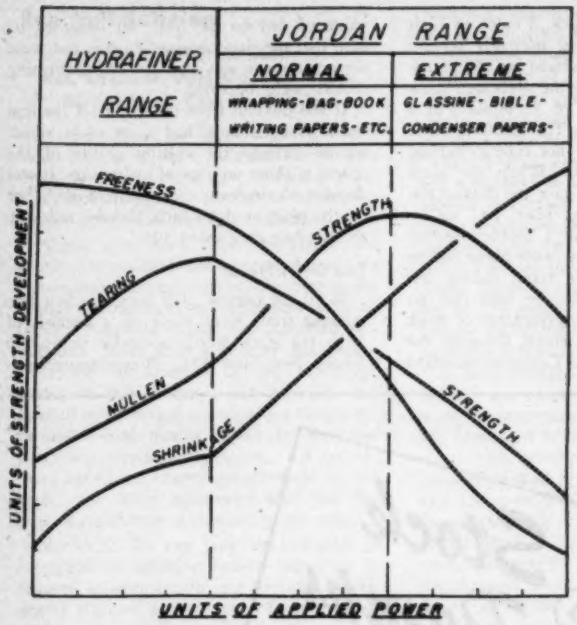


Fig. 1—Typical Hydrafiner-Jordan applications and performance characteristics

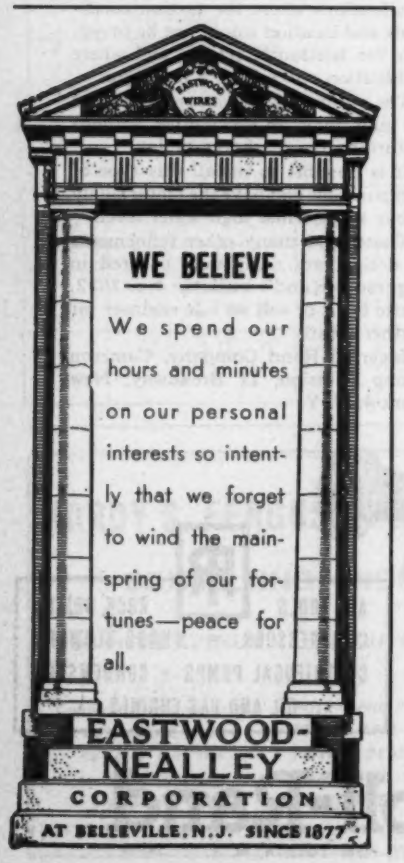
TABLE 3—Physical Strength Comparison (100% Beater Stock vs. Preheater and Refined Stock)

Test Series	Type Refining	Lab. Made Sheets: Bursting Strth., %	Lab. Made Sheets: Tear, %	Lab. Made Sheets: Tensile, %	Dry End Tests: Bursting Strth., %	Dry End Tests: Tear, %	Dry End Tests: Tensile, %	Av. Fold
4	100% beater stock 12 hours	87.4	293	19.2	116	...	...	1924
	2.5 hr. beating plus 29 min. refining	84.3	321	19.3	110	...	...	1747
	2¾ hr. beating plus 35 min. refining	...	...	...	110	...	...	1820
5	100% beater stock 12 hr.	...	...	...	111	273	40.4	....
	3 hr. beating plus 25 min. refining	...	...	...	94	270	35.8	....

TABLE 4—Savings in Power and Refining Time Beater-Refiner Cycling Refining Method vs. Beater Refining Only

Series No.	Horsepower per Ton per Day: Beater	Horsepower per Ton per Day: Beater and Refiner	Power Savings, %	Treatment Time, Total hr.: Beater	Treatment Time, Total hr.: Beater and Refiner	Time Savings, %
4	68.2	24.4	64.0	12	3	75
	68.2	28.1	59.0	12	3 hr. 5 min.	73
5	68.2	25.9	62.0	12	3 hr. 25 min.	72

phite. After a prebeat of 4 hours, the roll was raised, the sulphite was added and slushed, and the entire batch was refined at a motor load of 300 hp. for 20 minutes with no apparent cutting taking place. When the stock reached the machine in combination with beater treated stock, it was necessary to set up the jordan to obtain additional cutting, increase the suction and cut down the water on the slice. Here again as in the previous trial, there was a considerable drop in freeness with little change in fiber length indicating that the rag fibres were being hydrated but not sufficiently cut for machine operation. To make absolutely sure that the results obtained were correct and representative of this method of refining, the trial was repeated. After 10 minutes of refining there appeared to be no evidence of fiber cutting and since refining was progressing in exactly the same manner as experienced in the previous trial, it was decided to throttle back on the inlet valve about 60%. This change immediately dropped the power load since the rate of recirculating was considerably lowered and approximately 45 more horsepower was made available for refining. This power was taken up by increasing the plug setting and the refiner immediately began to cut the fiber. After additional 20 minutes, the stock appeared to be ready for the machine. When it reached the machine, no changes were required and paper comparable to that made from beater prepared stock resulted.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Test Series No. 3

Due to the possible difficulties caused by running a refiner with the inlet throttled, additional trials were made with the discharge throttled as is commonly done on wood pulp installations. This work was proposed to study the effect of holding the stock back in the refiner to intensify treatment between the bar edges and surfaces. The furnish for the next trial was a batch of 100% No. 1 rag and after a prebeat of three hours, the fibres were still quite long. The discharge valve was throttled and refining proceeded in the normal manner for approximately 10 minutes, at which time it was noted that no cutting was being obtained. Consequently, the valve was further throttled until it was about 75% closed and under these conditions, the refiner immediately began to cut. After a total of 30 minutes batch cycling treatment, the stock was judged to be entirely satisfactory and was pumped to a jordan chest.

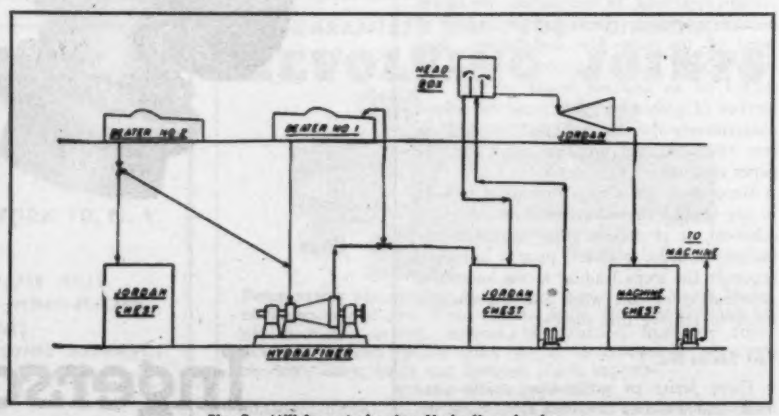

Fig. 3—Mill layout showing Hydrafiner hookup

Another check run was made on the same grade of rags, and the only changes in refining procedure were that the prebeat time was decreased to 2½ hours and refining time was increased from 30 to 32 minutes. The stock was slightly longer than in the previous test, however, the extra length was taken care of very easily by setting up slightly on the jordan plug. The increase in power on the jordan is of little significance in the over-all picture since it has a connected load of only 75 hp. Consequently, a slightly increased setting would mean a change of only 10 or 15 additional horsepower.

In general, the physical characteristics and formation of paper made from this stock showed a slight improvement over paper made from regularly beaten fiber. These results take on added significance in view of the data presented in Table 1. Note that the completely beater treated stock has a freeness of 263 ml. and an R-20 of 36.6%. The Hydrafined stock for the two trials had respective freenesses of 425 and 542 ml. and respective R-20 of 53.4% and 60%.

Test Series No. 4

Upon reinstallation of the liners, two additional series of refining trials were conducted and the data obtained are given in Tables 2 and 3. In the first trial, a furnish of 100% No. 1 rag stock was prebeaten for 2½ hours and refined for a total of 29 minutes, at which time the stock appeared to be short enough for the machine. The finished paper made from this batch of refined stock, plus a batch of standard 12 hour beaten stock produced a very good sheet with fine formation and good strength tests. In this case, freeness was 170 ml. greater and the fiber retained on a 20-mesh screen was nearly double that of the 100% beaten stock. A physical strength test comparison of these two stocks is shown in Table 3. Laboratory made sheets produced equivalent bursting strength and tensile values and showed a 28% tear increase for the refined stock. Dry end tests on 100% beaten stock gave values of 116% bursting strength and an average fold of 1924 against 110% bursting strength and an average fold of 1747 for the prepared fiber. These tests were judged to be exceptionally good and were well above the physical test requirements for this grade of paper.

In order to establish that the refined stock would produce the desired felting characteristics and physical strength tests, two beaters of refined stock were prepared so that they would run concurrently on the machine and produce a finished paper made entirely of 100% refined rag fiber. The stocks were prepared with an average prebeat time of 2¾ hours and both were batch refined for an average of 35 minutes. The resulting sheet ran very well on the machine, produced an excellent formation and as shown in Table 3, gave comparable physical tests with a bursting strength of 110% and an average fold of 1820 compared to a bursting strength of 116% on an average fold of 1924 for a 12 hour beaten stock.

Also in this series of trials, it was observed that the change in liner design had reduced the motor load by 95 hp. The plug was backed off and the discharge was not throttled. This differential thereby permitted the setting up of the liners to closer intimacy which, as the fractionation tests show, produced considerably more cutting than was obtained in previous tests.

Test Series No. 5

Another beater-refined stock preparation comparison was made to determine if any additional beneficial effects could be produced by throttling the discharge as was done in previous trials for series Nos. 2 and 3. The furnish for these trials was 100% extra No. 1 rags used to make a 24-pound currency sheet. This was an extremely hard stock as evidenced by the fact that after three hours of prebeating prior to refining, 79.3% of the fiber was retained on a 20-mesh wire. The batch was processed using the same procedures that were employed in series 4 except in this case, the discharge valve was throttled until it was 60% closed, during the 25 minute refining cycle. The results show quite clearly that the majority of the cutting occurred in the first 5 or 10 minutes of refining, while the remainder of the time was used principally to obtain the hydration required. Note that the per cent fiber retained on a 20-mesh wire was reduced in 5 minutes from 79.3 to 62.1 and in the remaining 20 minutes was further reduced less than 1%. The freeness, however, dropped steadily from 537 to 375 ml. producing the degree of hydration desired.

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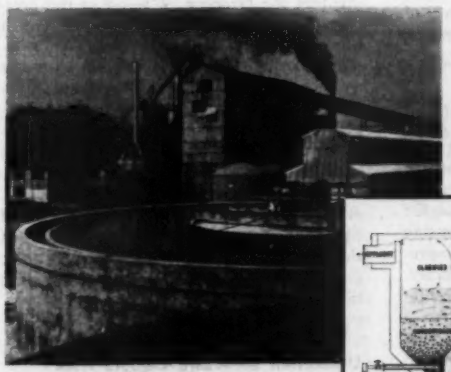

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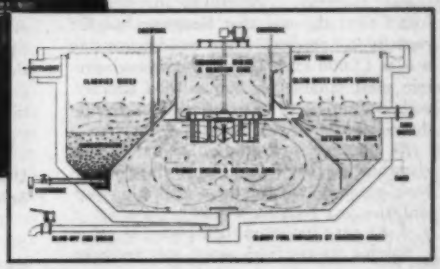

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The finished currency paper made from this test run did not produce as high strength characteristics as the paper prepared from 100% beaten stock. In fact, as shown in one of this series, the tests seemed to be enough lower with the refined stock to preclude the value of throttling the discharge. However, the sheet made from the refined stock was entirely acceptable, and was observed to have a better formation than the sheet made from 100% beater prepared fiber.

From the history of experience in rag mill refining, it appears that refiner treated stock may be favorably compared with beater treated stock both in felting and strength properties. This has been achieved at a great reduction in total power and process time. Table 4 presents data to show that under optimum operating conditions, power requirements may be reduced by as much as 60% and preparation time normally required by the finishing beaters has been reduced by as much as 75%. Hence, one beater-refiner combination may now accomplish the work of four beaters, which represents a 75% saving in beater equipment or an increase of 400% cent in beater output.

Microbiological Utilization and Disposal of Wood-Processing Wastes[1]

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and
MARTHA C. JOHNSON, Bacteriologist
Forest Products Laboratory[2]

In pulping and fiber-producing operations from 10 to 65 per cent of the dry weight of the wood is dissolved and wasted. A large part of this soluble material is carbohydrate and can be used. As chemical wood processing increases, the disposal of these soluble wastes is becoming a matter of growing concern. From 10 to 20 million tons of such wastes are produced annually in the United States. Only a small portion, largely from alkaline pulping processes and a few fiberboard plants, can be disposed of at the source without treatment to reduce its biological oxygen demand.

In carbohydrate-deficient Europe, these wastes have been utilized as a source of food and chemical products. Germany, Sweden, and other wood-producing European nations have developed large industries based on the use of the carbohydrates in these wastes. Many of these industries were started with government subsidies. High prices and the shortage of imports during World War II made these industries important to the national economy. American investigators found after the war that Germany had the capacity to produce from wood-processing wastes 15,000 to 20,000 tons of a high-protein yeast suitable for human food and several million liters of ethyl alcohol for industrial purposes per year (*7, 9, 12*).

At the Forest Products Laboratory and elsewhere in the United States, these wastes have been studied for their utilization possibilities and recently several reports (*2, 3, 4, 6, 8*) have indicated their potential value.

Soluble wastes from wood vary considerably, in amount and carbohydrate content, depending on the type of wood processed and on the process used. A softwood such as spruce or fir contains about 67 per cent of carbohydrate, 27 per cent of lignin, 5.5 per cent of extractives, and 0.5 per cent of ash. About two-thirds of the carbohydrate is stable alpha cellulose and one-third hemicellulose. About half the hemicellulose is hexosans and half pentosans; it contains molecules which break down into water-soluble products much more easily than do those of the alpha-cellulose. Hardwoods such as maple contain less lignin and more hemicellulose than do softwoods. The hemicellulose of maple contains about 80 per cent of the pentosans.

The ground wood pulping process, which involves the grinding of wood in the presence of water, converts about 10 per cent of the wood into soluble products. A steaming process, such as is used for fiber for wallboard, converts about 15 per cent; high-temperature heating about 20 per cent; sulphite pulping about 30 per cent; and processes for producing high-grade cellulose fiber for further chemical refinement, up to 70 per cent of wood into soluble products. A process to produce alcohol from wood hydrolyzates converts about 80 per cent of the total sugars. The wastes from all these processes are oxygen-consuming and present disposal problems.

DISCUSSION

Utilization of Waste Liquors from Sulphite Pulping Processes

This report describes work conducted at the Forest Products Laboratory on three of these wood-processing wastes in which yeast was used as the organism for the utilization of the waste.

On wood hydrolyzates yeasts exhibit two types of reactions; anaerobic fermentation for the production of ethyl alcohol from hexoses, and aerobic fermentation of both hexoses and pentoses for the production of food yeast. The latter reaction is more efficient as a means of reducing oxygen consumption of the spent liquor.

Sulphite waste liquor contains from 9 to 15 per cent of total solids, of which 2 to 4 per cent is sugars, depending on the severity of the pulping process. These sugars appear to be the most active oxygen-consuming constituents of the solution. The biochemical oxygen demand of such solutions ranges from 35,000 to 65,000 ppm. To ferment these solutions with yeasts, it is necessary to remove some of the sulphur dioxide and to neutralize the acidity. This treatment alone removes a part of the oxygen-consuming material.

Alcoholic fermentation of waste sulphite liquors is practiced at a pulp mill at Thorold, Canada (*11*) and one at Bellingham, Wash. (*1*), uses 60 to 65 per cent of the sugars, thereby reducing the biological oxygen demand 40 to 45 per cent. These findings confirm those reported by Tyler (*13*). Alcohol in concentrations of 1 to 1.5 per cent by volume is produced in 12 to 24 hours. By means of efficient stripping and rectifying stills and proper controls, the alcohol can be recovered at a cost that should make the process competitive in large plants.

It is possible that this means of removing oxygen-consuming material from solution, if found economical at sulphite pulp mills, will be sufficient to permit its disposal without further treatment.

The biological oxygen demand of waste sulphite liquors may be reduced also by the propagations of yeasts on the sugars. With sufficient nitrogen, yeast is produced that contains from 48 to 55 per cent of protein on the basis of the dry weight (*3*). With less than the required amount of nitrogen, yeast high in fat is produced.

Because of the foaming tendency, it is necessary to use special yeast-propagating equipment with provision for control of foam by mechanical means. The Waldhof type of equipment (*9, 10*), as developed in Germany for sulphite waste liquor, provides for continuous introduction of the sugar solution and continuous removal of the yeast suspended in the spent solution. The sulphite liquor may be fed in at the rate of one-fourth to one-third the volume capacity of the propagator per hour. About 200 to 300 cubic feet of air are required per pound of dry yeast produced. The chemical requirements, based on 100 pounds of sugar in the feed, are as follows: 3.2 pounds of nitrogen, supplied in the form of urea, ammonium sulphate, or anhydrous ammonia; 1.5 pounds of phosphorus pentoxide, sup-

(1) Presented at the Society of American Bacterioligists, Minneapolis, Minn., May 10-14, 1948.
(2) Forest Service, U.S. Department of Agriculture. Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

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plied as any of the common phosphates; and 1.0 pound of potassium, supplied as the sulphate or chloride (6).

Approximately 95 per cent of the sugars, both pentose and hexose, are utilized by this process (3). The biological oxygen demand is reduced from about 40,000 to between 16,000 and 20,000 ppm. The yield of yeast based on sugars utilized is about 50 per cent, and the protein content of the yeast is 50 to 52 per cent. The yield of dry yeast is equivalent to 100 to 150 pounds per ton of pulp produced. In Germany during the war this type of yeast formed a very important source of protein for humans. One experimental plant to produce fodder yeast is being built at Rhinelander, Wis. It is expected that this yeast will provide a valuable source of protein and vitamin B for chickens, turkeys, pigs, and other animals. Magnesia-base waste pulping liquor was found to be as suitable as the calcium-base liquor for the propogation of yeast.

Utilization of Processing Water for Fiberboard Production

In one process for producing fiberboard from wood the wood chips are softened with steam before they are passed through defibering equipment. This treatment converts about 15 per cent of the dry weight of the wood into soluble products that are removed in the processing water. Usually, the waste processing water contains 1 to 1.5 per cent of organic material with a biological oxygen demand ranging from 7,000 to 15,000. This high biological oxygen demand limits the locations at which such processing plants may be placed.

An analysis of the steamed chips showed that they contained approximately 6 per cent of soluble material on the basis of the wet chip. This material was removed by countercurrent extraction with hot water, giving a solution with a concentration of 4.3 per cent of total solids, of which 3.61 per cent was organic material. Before hydrolysis the solution had a reducing-sugar value of only 0.85 per cent. After treatment with 0.5 per cent sulphuric acid for 15 minutes at a pressure of 15 pounds per square inch, the reducing-sugar concentration was increased to 2.78 per cent. Only 37 per cent of the total sugar was fermentable to alcohol, but 92.3 per cent was utilized by yeast growth. The yield of yeast on sugar used was 45 to 50 per cent, or 75 to 85 pounds of yeast per ton of wallboard, and the reduction in biological oxygen demand was about 55 per cent. By re-using the defibering processing liquor for extraction of the chips, the amount of water required for the whole process was decreased to one-fourth the original volume, and the total organic matter after yeast production to be disposed of was consequently reduced 75 per cent.

Utilization of the Spent Liquids from a Plant Producing Alcohol from Wood Hydrolysates

In producing alcohol from wood sugars, the wood is converted into sugar by treatment with 0.5 per cent sulphuric acid at elevated temperatures, starting at 150 C. and slowly rising to 185 C. With proper control of the flow of the dilute acid through the chips (5), it is possible to obtain solutions containing 5 per cent of reducing sugar, with total reducing-sugar yields 50 to 52 per cent of the weight of the dry, bark-free wood substance.

This solution, before fermentation, was found to contain 6.48 per cent of total solids, 5.97 per cent of organic matter, and 5.0 per cent of reducing sugar, and to give a biological oxygen demand value of 35,600 parts per million. This solution, when fermented to alcohol, yielded 2.1 per cent by weight, or 2.7 per cent by volume, of alcohol. The spent liquor contained 2.98 per cent of total solids, 2.38 per cent of organic matter, 0.91 per cent of reducing sugar consisting mostly of pentoses, and had a 5-day biological oxygen demand value of 14,000 parts per million. Nitrogen, phosphate, and potassium sulphate in the required quantities were added to the spent liquor, and the resulting solution was fed into a Waldhof yeast propagator at the Forest Products Laboratory at a rate of one-third the volume capacity of the propagator per hour.

The organic solid content of the solution after removal of the yeast was 1.9 per cent, its reducing-sugar value 0.36 per cent and its biological oxygen demand 8,900 parts per million. An osazone test indicated there were no sugars present. Sixty per cent of the reducing material had been consumed and the biological oxygen demand had been

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reduced about 40 per cent. The yeast yield was equivalent in weight to 52 per cent of the total sugar present expressed as reducing material or 86 per cent of the sugar used, amounting to about 90 pounds per ton of wood used. This high yield was accounted for by the utilization of volatile organic acids that were present in the solution but that did not show up as organic solids or as reducing sugar.

CONCLUSIONS

A study of the action of yeast on soluble wood-processing wastes reveals that sulphite waste pulping may be fermented, producing about 20 gallons of alcohol per ton of pulp with a 40 per cent reduction in biological oxygen demand, or used to grow yeast, producing 100 to 150 pounds of yeast per ton of pulp with a 50 to 60 per cent reduction in biological oxygen demand. Processing water from the production of fiberboard may be reduced in volume and the sugars utilized to produce 75 to 85 pounds of yeast per ton of board and thereby reduce the biological oxygen demand to one-fourth the original value. Pentose-containing liquors from the production of alcohol from wood hydrolyzates may be used to produce 90 pounds of yeast per ton of wood, resulting in a 40 per cent drop in biological oxygen demand.

Acknowledgment: The authors wish to give credit to Mr. G. Lawton of the Wisconsin State Laboratory of Hygiene for the many B.O.D. determinations given in this report.

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The Testing and Designing of Fibreboard Containers*

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The testing and designing of fibreboard containers is much more of an exact science today than it was a few years ago. World War II greatly accelerated this technique because of the urgency to deliver American made merchandise to all parts of the world. Victory literally depended on the safe arrival of ammunition, subsistence, clothing and all the other military materiel and in most cases the method of packing determined whether the merchandise arrived in usable condition. Many of us still shudder when we remember the experiences of the early days of the war and our chief consolation is the excellent showing that packaging made toward the end of the war.

The war also developed a large crop of top notch packaging engineers and these young men are now located as container salesmen, laboratory technicians and packaging engineers. Usually they can show the old timers a lot of new wrinkles in efficient packaging methods.

In the early days of the corrugated box, we used to develop a new container by hit or miss methods. If one scheme didn't work, we would try something else. If we had doubts, we would pack and seal the box and roll it down the back stairs—and usually we were afraid to look at the result. We made innumerable test shipments—one or two boxes at a time. Sometimes we suspected that our competitors must have got wind of the shipment and sabotaged it. I don't know anything more uncertain than the results of a test shipment of a single box. It's too much like gambling, and technical men don't like gambling—much.

Then came the revolving *drum tester* (about thirty years ago) and we thought we had the last word in the technical evaluation of a container. As a matter of fact the drum was, and still is, a very valuable testing tool if properly used. It revealed the container's ability to protect the contents as well as to retain them, but it didn't actually drop the box nor did it inflict severe impacts. It didn't measure resistance to compression nor a lot of other important properties of a shipping container.

Today we know that there is no universal testing machine. The real pay off is how the package stands up under the actual conditions to which it is to be exposed. One way to find out is to make hundreds of test shipments—enough to "average out" the abnormal damage. But this is a costly and time consuming procedure. It is too much like burning down the house to roast the pig.

The next best method is to devise testing

(*) A talk delivered before the Freight Loss and Damage Prevention Committee, Great Lakes Regional Advisory Board, Cleveland, September 14, 1948.

instruments that will measure the specific conditions we are most interested in and that is just what has been done.

Thus a *compression test* is used on merchandise such as soap flake cartons where stacking loads must be carried by the walls of the container and not by the contents. Such a test, however, means little when applied to the top of a case of canned goods because the cans themselves are so strong in that direction. End compression on can cases is valuable but a drum test is even better.

Glassware and liquids in glass are naturals for a drum tester, although a *drop test* is preferred by some shippers. Heavy or massive articles such as,washing machines or refrigerators in fibreboard are best tested with an *impact tester* such as the Conbur. Case eggs are often subjected to a *vibration test.*

The components of fibreboard boxes are also subjected to various tests. This is really another subject so we will only mention some of the more important tests such as the Mullen, Cady, Caliper, Rigidity, Puncture, Weight and Score.

Many large shippers have installed laboratories of their own where one or more of the desirable container qualities can be evaluated with standard testing machines. These instruments can be purchased or some of them, such as a compression tester can be constructed at home. Most of the home made compression testers are built over a platform scale.

However, it is not necessary to have your own testing laboratory. There are excellent custom laboratories available, fully equipped to test every property of a container. Several public or semi-public institutions also have box testing equipment. Examples are the U. S. Government Forest Products Laboratory at Madison, Wisconsin, and the Institute of Paper Chemistry, Appleton, Wisconsin. The armed forces also maintain several testing laboratories of their own.

In the early days of box testing it was soon found that most results are considerably affected by the moisture content of the fibreboard which in turn depends on the relative humidity of the atmosphere. Therefore, whenever possible this work should be done at some constant relative humidity and temperature. Most box testing laboratories operate at 50% R.H. and 73 Fahr.

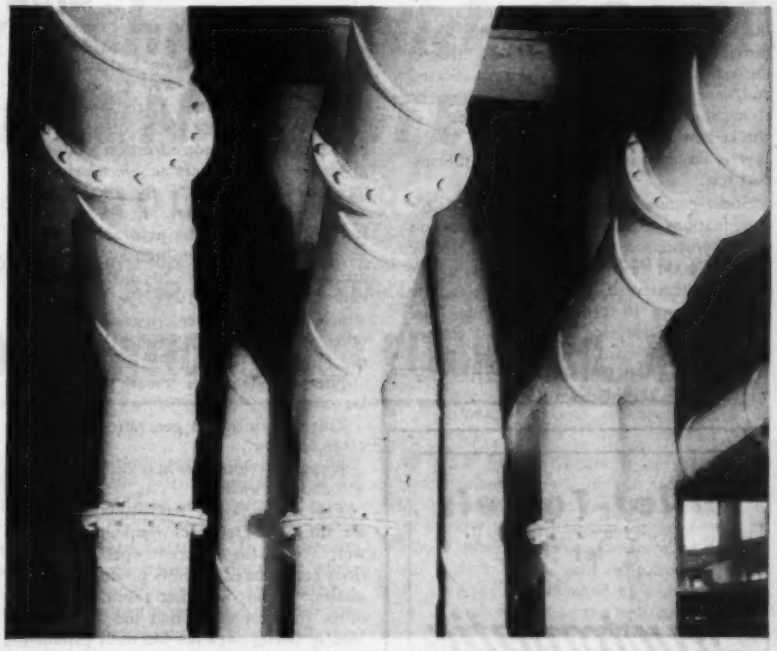
These constant conditions not only make possible a dependable comparison of day-to-day results but also prevent many misunderstandings. For example, a corrugated box maker might guarantee a top to bottom compression of 900 lbs., on an empty corrugated container at 50% R.H. and 73 Fahr. If this box is later tested by the customer on a humid Summer day (say 80% R.H.) without conditioning, it would test about 600#—or only 2/3 of the guarantee.

On another occasion, a customer complained that a shipment of 200 test corrugated boxes were averaging only about 185. An investigation showed that the customer was testing the boxes in a mid-Summer atmosphere of between 80% and 90% relative humidity. The boxmaker had shown a test of 235 in his laboratory under controlled conditions of 50% R.H. and 73 Fahr. A few days later when the weather had cleared up, these same boxes were going over 200 on the customer's Mullen tester.

Rule 41 of the Consolidated Classification now states that "Cady or Mullen test must be made after board has been subjected for at least 3 hours to normal atmospheric conditions (50% to 70% relative humidity)." A minimum of 50% is given because the Mullen test of corrugated board will also be abonormally low if the boxes have dried out, as is often the case when they are stored or exposed in a steam heated room in the Winter time.

Speaking of Rule 41, you may have noted that glassware and liquids in large metal cans are the only commodities whose container specifications are covered in the Rule itself. The carriers, boxmakers and shippers all realize that there is no universal specification that will cover fibreboard containers for all commodities. Rule 41 described boxes but does not mention performance tests. Committees representing these interests are now at work in an endeavor to develop specifications and performance tests for specific commodities. An indication of this trend is the fact that the Classification Committee recently granted a permit under Rule 49 for a shipper to use a lower Mullen test box provided that it meets a minimum top to bottom compression test.

So far we have not said much about the designing of fibreboard containers. As we become more familiar with testing methods for specific commodities, we realize that our



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container designs must also be affected by the nature of the contents.

Thus, with liquids in glass, we find by laboratory tests, that glass breakage may occur in the center of the package and not always at the edges and corners. The experienced desinger has accordingly adopted the maxim: "Build from the center out." By this he means that it is of the utmost importance to protect the bottles from each other and to produce a snug fit. We might even go so far as to say that strong and proper inner packing here is almost more important than the test of the outer case. Here the designer likes to check his progress with some form of rough handling such as the drum or drop tester.

For packing expensive, fragile objects like small radios, television sets and certain furniture items, the designer has to think of outside blows and impacts so he provides creased sheet "air cushions" around the six sides and also uses various creased and/or die cut sheets to keep the contents from shifting. Here again the design is checked by drum and drop tests, or if the case is large or heavy, he may add the impact test.

Some commodities present very difficult combinations of heavy weight at one end and fragile portions at the other end. An electric fan is a good example. At one time it was thought necessary to provide very elaborate inner packing to protect the blades and wire guard. Today we know that if we can lock the heavy base and motor in such a way that they will not shift inside the box, we can leave the blades alone.

Heavy or massive objects such as washing machines or refrigerators usually require a wooden skid to which the contents and the fibreboard box and packing are securely anchored, usually with steel straps. One of the greatest developments in fibreboard designing has been the remarkable replacement of wood by fibreboard for extra large items such as electric refrigerators weighing several hundred pounds. One of the largest producers is now shipping all its domestic refrigerators in a corrugated package with only the bottom skid made of wood. You can read the specifications under Package #994, which was added to the Classification August 18, 1948, and carries no size or weight limit. They are saving money and having hardly any claims on this package which has been in use now for about a year on a Rule 49 permit. Don't think, however, that this design wasn't the result of many hundreds of man-hours in design and re-design and laboratory testing.

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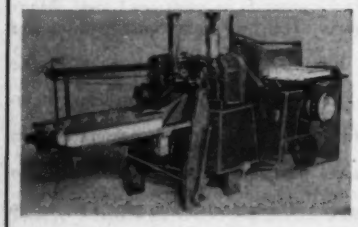

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Electrical Developments in the Pulp and Paper Industry*

R. R. BAKER, Paper Mill Application Engr.
Industry Engineering Dept.
Westinghouse Electric Corporation

The efficient generation and distribution of electric energy, as well as its effective utilization, is essential in the operation of the pulp and paper mills of the United States. Careful consideration must be given to developments in electrical equipment which permit of the most efficient overall plant operations. In the year 1947 it is estimated that the pulp and paper industry used some 14 million kw-hrs. in producing approximately 20 million tons of paper. In the year 1945, the last year for which complete figures are available, among other major industries in the United States, the Pulp and Paper Industry ranked:

First, in power per ton of product—700 kw-hrs.

Third, in installed generating capacity—1,348,000 kw.

Fourth, in total kw-hrs. consumed—11,450,000,000 kw-hrs.

The actual power requirements vary for the different grades of pulp and paper as well as for the different operating conditions encountered in mills producing similar grades. From operating results in various mills, it is estimated that the average mill load in horsepower per ton daily production is approximately as follows:

Pulp	*Hp.*
Chemical, all grades	7.5 to 15
Groundwood	50 to 75
Paper—Exclusive of Pulp Preparation	
Paperboard	15 to 20
Newsprint	15 to 20
Book	20 to 35
Kraft	20 to 35
Glassine	40 to 50
Bonds	50 to 60

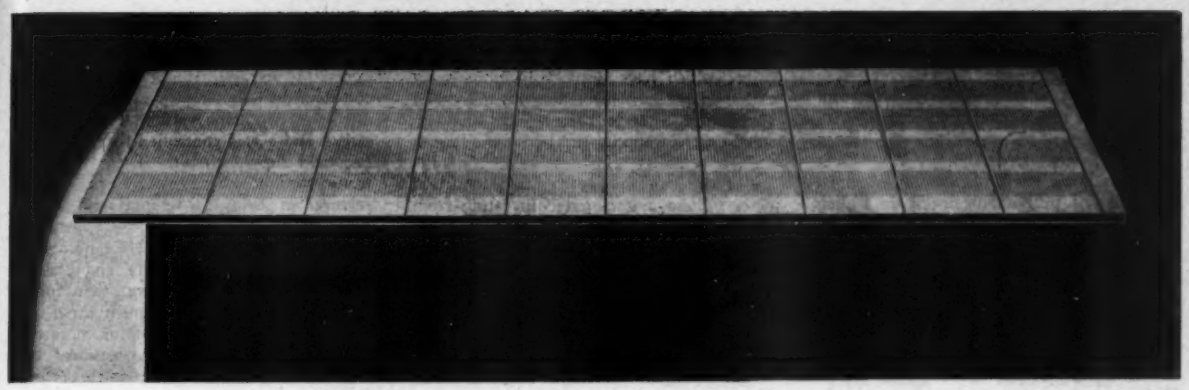
The per capita consumption of paper products is higher in the United States than in any other country in the world. Statistics indicate a daily consumption of approximately 0.85 pounds per individual. This high daily consumption is undoubtedly due to the wide diversity of paper uses. Paper which was originally used for printing almost exclusively, now has a multitude of other uses such as building papers, wrapping and bag papers, towelling and tissue, boxboard and container boards, drinking cups and food containers, as well as a host of others. To meet the demands of this ever expanding market it has been necessary for the industry to convert from a hand craft to a highly mechanized industry. Each craftsman in the modern plant requires an investment of more than $18,000, and utilizes some 15 horsepower in power driven equipment in producing approximately 800 pounds of finished paper per day.

Due to the many inherent advantages which electric energy affords in power generation, distribution and utilization, it has been almost universally adopted by the pulp and Paper Industry as its source of motive power. It is estimated that the industry is some 88% electrified. This form of energy may be developed at the point of greatest economy. It may be transmitted long distances with only slight losses, to a mill site which may be most suitably located for converting the raw materials into the finished product. Electric power distribution presents no serious problems and the mills may be laid out without other consideration than that of the most economical conversion of the raw materials. The many different operating characteristics available in the modern alternating and direct current motors, together with the features of either manual or automatic control permit economic operation of all power driven equipment throughout the mill.

Typical Plant Requirements

The modern mill requirements include motors from fractional horsepower, for small auxiliaries, to motors of 3000 hp. capacity for driving the magazine grinders required in the production of ground wood pulp. The motors may be arranged for direct connected, geared or belted service with horizontal or vertical mounting and for location on the floor, wall or ceiling. Depending on their location and surrounding conditions the motors may be supplied open, semienclosed, splash and drip-proof, totally enclosed fan-cooled, or totally-enclosed forced ventilated. An idea of the motor requirements of a modern mill can be obtained from a recent electrification in a

(*) Paper presented at the summer general meeting of the American Institute of Electrical Engineers held in Mexico City, Mexico, June 21-25, 1948. Recommended by the AIEE general industry applications committee and approved by the AIEE technical program committee. Mr. Baker is an associate member of AIEE (Application submitted December 8, 1947).



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balanced kraft pulp and paper mill having a daily capacity of 600 tons of pulp and paper. The installed motor capacity in this plant is 23,000 hp. Power for this plant is provided by 15,000 kw. in turbo-generator capacity, which is equivalent to 75% of the installed motor capacity. The motor list includes some 344 induction motors representing a total of 12,300 hp. ranging in capacity from 1 to 250 hp., and some 32 synchronous motors totalling 10,700 hp.

Power Generators

The pulp and paper industry in the United States produces the major portion of its total energy requirements and purchases only a minor portion from local utilities. Statistics for the year 1946 indicate that this industry produced 70 percent of its total requirements as compared with a national average of only 30 percent. This situation is undoubtedly due to the fact that in this industry large quantities of power can be generated as a by-product of the steam require dfor process purposes. To produce each ton of paper requires in addition to 700 kw-hrs., from 10,000 to 20,000 pounds of steam at pressures from 25 to 150 psi. With boiler plants in the modern mills, operating at steam pressures of 600 psi and above and steam temperatures of 700 Fahr. and higher, the industry is able to generate a large part of its power requirements as a by-product of the process steam. These possibilities have led to the development and extensive use of the bleeder type turbine in the industry. Depending upon the operating requirements these turbine units are designed for either single or double pressure bleeding and for either condensing or non-condensing operation. Unites ranging from 1000 to 10,000 kw capacity are installed. In addition to steam power generation in localities where low cost water-power sites are available, power is frequently generated at these low cost sites and transmitted to the mill over high tension transmission lines.

Sixty cycles appears to be the accepted frequency in the modern mill. Power transmission lines are operated at various voltages, 6.6 and 13.2 kv. being quite common. In the modern mill, power is generated at a voltage consistent with plant size and concentration of power as well as with the distribution and motor requirements. 2400 volts is frequently specified, however, with large generating units and a high concentration of power both 4150 and 6900 volts have been used. In plants where the power is generated at 2400 volts, motors 100 hp. capacity and over are usually selected for this voltage. Where these motors are required for jogging service necessitating frequent starting and stopping, the use of air-break contactors for the control are recommended.

Power Distribution

Power distribution is an important consideration in the layout of the modern mill. Power driven equipment is located in numerous rather widely separate areas and it is necessary to provide both high and low voltage power service to each of these areas. It is quite common practice to extend one or more feeder circuits from the central power plant to each of the areas. Power is distributed at the generator voltage and is directly applied to the larger motors at this voltage. Power transformers selected for indoor service and of proper capacity to meet the load demand of each particular area, serve to reduce the voltage for application to the smaller motors. Dry type transformers provide dependable service for the atmospheric conditions characteristic of pulp and paper mills. Such transformers have a somewhat lower installation and maintenance cost than the conventional oil insulated transformers.

The industry has been quick to recognize the merits of factory built metal clad switchgear for the important function of power distribution. Such equipment can be properly installed at low cost. The features of this type of switchgear assure safe continuous operation with a minimum of outage time for inspection and repair. Metal clad switchgear is available for any of the established distribution voltages with either oil or air-break switches, and for either light or heavy duty depending upon the plant capacity and the possible fault currents. Light duty gear is suitable for 25,000 and 50,000 k-va interrupting capacity and the heavy duty gear for 100,000 to 500,000 k-va. The use of this modern metal clad switchgear with either draw-out or vertical lift circuit breakers affords maximum safety and assures minimum installation and operating costs.

Many of the mills recently built or now under construction are specifying con-

trol centers for both high and low voltage motor control. These factory built control centers provide power bus, disconnecting switches, electrically operated motor control and both circuit and motor protection. With this arrangement the control may be located at some distance from the motor which it serves and the control functions obtained by means of pushbutton or master switch conveniently located adjacent to the motor. This arrangement permits removing the control from congested manufacturing areas and placing it in areas where it may be properly protected against the adverse atmospheric conditions frequently encountered in pulp and paper mills. The segregation and grouping of the control possible with these control centers permits the establishment of comprehensive maintenance schedules which are essential to continuous, trouble free, efficient plant operation.

In specifying either the high or the low voltage control centers due consideration must be given to the possible fault currents to be encountered. The recent development of the current limiting fuse for use in conjunction with 2300 and 4160 volt motor control has increased the interrupting capacity of this control to 100,000 k-va on 2300 volt service, and 150,000 k-va on 4160 volt service. Fault currents on the low voltage service are usually limited by the reactance of the transformer in the power center serving the area. Such transformers usually do not exceed 1500 k-va capacity and, therefore, serve to hold faults within 50,000 k-va.

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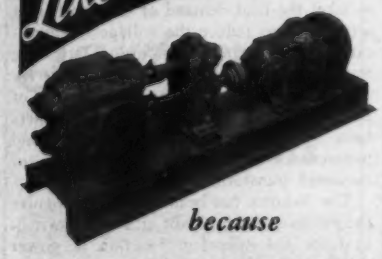

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General Purpose Mill Motors

Although the industry uses many motor drives which have been designed to meet the special requirements of the individual application, a large part of the total installed motor capacity and by far the largest number of motor units installed in the mills are of the standard squirrel cage induction type. These motors range in rating from fractional to perhaps 200 hp. capacity. They drive such equipment as pumps, screens, conveyors and agitators. The control for these motors ordinarily consists of magnetic full voltage starters providing only "Start and Stop" control functions. These motors are required to operate 24 hours per day, frequently 6 and sometimes 7 days a week. To a large degree the plant performance is dependent on the uninterrupted operation of this important group of motors. To insure good plant performance such motors must be provided with all necessary protective features such as enclosures, winding insulation motor mounting, etc., to meet the operating conditions. These motors must also be carefully maintained to permit continuous uninterrupted service.

Synchronous Motors and Plant Power Factor

By the application of synchronous motors with leading power factor to certain drives throughout the mill it is possible for pulp and paper mills to maintain high overall plant power factor. Synchronous motors are frequently applied to many of the motor generator sets as required for power supply on adjustable speed motor drives, to Jordans and vacuum pumps, to chippers and to grinders. The high operating plant power factor resulting from the proper application of synchronous motors relieves the generators, transformers, switching equipment, and feeder circuits of out of phase current, and thus increases the effective capacity of such equipment.

Electronic and Rotating Regulators

Many developments have recently been made in motor and control equipment for application in the paper industry. These developments include among others, improvements in automatic control and regulating equipment, through the introduction of electronic devices and rotating regulators to meet the more exacting regulating requirements. Although sectional paper machine drive has been an accepted standard for many years, recent developments have improved the reliability and the performance of this equipment. Fundamentally, a sectional electric paper machine drive includes direct-current motors for driving the individual sections of the paper machine, a power set for converting from alternating to direct current and for supplying power to the section motors, control permitting independent operation of the individual sections and section speed regulating equipment providing for an accurate maintenance of the relative speeds of the various sections of the machine required for the proper formation of a continuous web of paper.

With the modern sectional electric drive the older forms of mechanical differential regulators have been replaced with electronic regulators. As supplied by one manufacturer, this electronic regulator consists of several basic elements. These basic elements include: a master a-c reference bus, individual section reference a-c tachometer generators and individual electronic regulating elements including a vacuum tube mixer circuit, a two stage vacuum tube amplifier circuit and a grid controlled thyratron rectifier field supply circuit. These new electronic section speed regulators provide the features of field forcing and anti-hunting essential to high speed response. They have an infinite number of regulating points and provide increased sensitivity and stability with a broader control range than former types. After initial adjustment these electronic regulators require nothing more than routine inspection and an occasional tube replacement to maintain top-notch performance.

The modern sectional electric drive may include a power set with a single main direct-current generator for supplying power to the section motors or it may include individual generators for each independent section of the machine. With the single generator the electronic regulators are arranged to control the section speed by control of the excitation of the individual section motors. On the other hand, with multiple generators the regulators control section speed through control of the excitation of the individual generators.

The auxiliary or helper drive is an extension of the sectional drive principle. Direct-current motors are applied to certain auxiliary sections of the paper forming machine such as the molds and primary presses of cylinder machines, the primary couch roll, wire return roll and dandy roll of fourdrinier machines, and top main press and dual press auxiliary rolls on both types of paper machines. Where these auxiliaries form a part of a complete sectional electric drive the motors are operated in parallel with the main section direct current motors and no further provision is required for synchronizing their operating speeds with the balance of the machine. Where the auxiliary drives are applied to paper machines equipped with line shaft mechanical drive, it is necessary to provide a direct current generator which is operated at a voltage proportional to the operating speed of the machine for synchronizing the operations of the auxiliaries with the main drive. The synchronizing generator may be driven from the line shaft or it may form part of an auxiliary power set. These auxiliary drives materially improve the quality of the paper through better formation. They also reduce operating costs through improved felt or wire life and by more effective water removal on the forming end of the machine.

Rotating Regulators

The ROTOTROL, a form of rotating regulator as supplied by one electrical manufacturer [*Bowser, Inc.*], has been extensively employed by the industry because of the advantages it affords in the automatic control and regulation of many of the functions required of the power driven equipment. The ROTOTROL is similar in design to a standard quick response d-c generator. It has a number of independent field windings which are energized in various ways depending upon the regulating problem. These windings include the pattern,

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pilot and self-energizing fields. The pattern field normally sets the pattern for the results to be obtained by the regulator. The pilot field provides a means for measuring the operating results produced by the regulator and comparing these results with the prescribed pattern. The pattern and pilot fields are normally connected differentially and any net difference in the field ampereturns produces a highly amplified corrective action on the part of the ROTOTROL to reduce this difference. The self-energizing field is usually connected in series with the armature of the ROTOTROL and the design is balanced so that the voltage produced by the current in the self-energizing field is just sufficient to overcome the total IR drop in the armature circuit. In other words, the IR drop line for the armature circuit and the saturation curve of the ROTOTROL coincide. This is possible when the generator is operated at voltages below the knee of the saturation curve.

ROTOTROL presents no more of an operating problem than the ordinary d-c exciter. It is provided with air gaps which are comparable with the standard d-c machine. The brushes are standard commercial sizes and are operated at low current densities. Not less than two brush arms per polarity are used to maintain a fixed brush drop and the stator frame is usually hydrogen-annealed to reduce to a minimum the effect of residual magnetism.

In pulp and paper mills ROTOTROLS have been applied on paper forming machines to accurately maintain both the operating speed and the relative speeds of individual sections of the machine. On super-calender drives ROTOTROLS serve to maintain uniform threading speed and to synchronize the operations of the unwind and wind-up stands with the supercalender. In connection with both reels and unwind stands the ROTOTROL serves to maintain constant sheet tension as the roll varies in diameter between a full and empty roll. With the primary-couch roll drive as applied on many modern fourdrinier machines it serves to maintain a motor driving effort consistent with the vacuum maintained in the roll. Applied to wet-end auxiliaries and other helper drives the ROTOTROL maintains uniform operating conditions over the wide range of operating speeds. Due to the simplicity of its design the ROTOTROL presents no more of a problem to the mill operating personnel than a standard exciter unit, however, it provides an accurate and dependable means of automatic control.

Hydraulic Barking

The recent introduction of hydraulic barking in many mills particularly those located on the West Coast has necessitated the development of a suitable motor drive. With hydraulic barking the bark is ripped from the log by high pressure and velocity jets of water directed tangentally against the surface of the log. Logs as large as 60 inches in diameter and 30 foot long can be handled in a single operation. This method of operation permits of a saving in raw material as well as man power and produces a clean well-barked log for the chipper. In normal operation it is necessary to move either the jets or the log from end to end and at the same time to index or rotate the log in order to completely remove the bark from the entire surface.

Motor drives for the hydraulic barkers include power equipment for the nozzle carriages and the log manipulators as well as magnetic control providing complete control for a single operator from a pulpit type control station. In order to secure a high rate of production with logs of various diameters adjustable speed operation is ordinarily required of both the nozzle carriage and the log manipulators and direct current adjustable voltage drives are specified. Heavy production schedules require frequent reversals and the equipment is selected for this duty.

Full Log Chippers

To take full advantage of hydraulic barking of the large size log, chippers have been developed capable of handling 30 foot logs up to 42 inches in diameter. Such chippers are capable of chipping one of the large logs in less than 30 seconds. Synchronous motors in ratings from 1000 to 2000 hp. have been developed for direct coupling to these chippers. These motors have high pull out torques required to meet the peak load torques when chipping a full size log. These motors are selected of adequate thermal capacity to meet the normal production rate. They have extremely heavy mechanical construction to withstand the severe vibration resulting from the reaction of the chipper knives passing through the logs, and the damper windings are of spe-

cial construction to permit acceleration of the high WR^2 of the chipper disc.

Supercalenders

Wide high speed supercalenders equipped throughout with anti-friction bearings for absorbing both radial and thrust loads have replaced older designs in the finishing room of the modern paper mill. These stacks are capable of handling sheets 160 inches in width at speeds in excess of 2500 feet per minute. The modern supercalender drive provides an adjustable speed main stack drive with both synchronized wind and unwind stands. Such a drive includes a main d-c adjustable speed motor with suitable gearing for connecting to the lower roll of the main stack, a motor generator set for supplying power for the drive, and adjustable speed d-c units for connecting to both the unwind and wind-up stands. These drives also include full automatic control with a centralized control station and metering equipment indicating such operating conditions as speed, and sheet tension between the calender and both the unwind and the wind-up stand. These modern drives provide such operating features as: stabilized threading speed, automatic current limit acceleration and deceleration between threading speed and pre-set operating speed, automatic control of sheet tension between calender and unwind and wind-up stands, adjustable speed operation over a wide operating speed range, inertia compensation preventing the loss of tension in the sheet when making speed adjustments, stalled tension, pay-out on unwinding stand, and slack take-up on the wind-up. These various operating features are required to obtain efficient operation of these modern high speed supercalenders.

Finishing Room Equipment

In the finishing room the adjustable voltage direct current motor drive is suitable for many applications such as winders, pasters, corrugators, waxing machines, etc. Such a drive includes a motor generator set with direct connected exciter, one or more direct current motors for driving the process equipment either as a unit or in individual sections, and complete control for both a-c and d-c equipment. The power set serves to convert the mill power from alternating to direct current for use on the drives. The direct current motors may be operated over the required speed range by armature voltage control, by motor shunt field control or by a combination of armature voltage and motor shunt field control.

Speed adjustments are made by means of rheostats in either the generator or motor field circuits. These rheostats may be either hand or motor operated. With motor operated rheostats the features of pre-set speed control as well as controlled rates of acceleration and deceleration may be obtained.

In conclusion attention should again be called to the important contributions electrical developments have made in the efficient operation of the mills of the pulp and paper industry. The economic generation and distribution of electric power together with its effective use has resulted in a high quality low-cost product which is required to meet the demands of an ever expanding market. Electrical equipment properly selected, installed, and maintained assures many years of efficient operation in the many mills throughout the country.

Tentative Program — Southern and Southeastern Divisions of The American Pulp and Paper Mill Superintendents Association—Atlanta Biltmore Hotel, Atlanta, Georgia, October 20 to 23, 1948

Wednesday Evening, October 20

8:00 P.M. Registration: Lobby Georgian Ball Room
R. C. Bullock—H. M. Morris

Thursday Morning, October 21

8:00 A.M. Registration: Lobby Georgian Ball Room
R. C. Bullock—H. M. Morris

10:00 A.M. Meetings: Lee M. Bauer, chairman
Georgian Ball Room
Invocation, Rev. Vernon S. Broyles, Jr.
Address of Welcome, Hon. Wm. B. Hartsfield, Mayor of Atlanta
Response, Wm. H. Brydges, trustee of American Pulp and Paper Mill Superintendents Association
Jonsson Screen: Sven Fahlgren, Bird Machine Co., South Walpole, Mass.
Vickery Felt Conditioner: B. D. Warren, Bird Machine Co.
Labor Relations Within Industry: Austin M. Fisher, Fisher Associates, New York City

12:30 P.M. Joint Luncheon, Empire Room (Speaker to be announced)

Thursday Afternoon, October 21

2:30 P.M. Meetings: Frank M. Jensen, Chairman
Georgian Ball Room
Speakers: Rudy Kutter, vice pres. and sales mgr., Black-Clawson Co. Tany Agronin, chief engineer, Shartle Bros. Machine Co. (Subject of Papers not yet announced)
Round Table Discussion: "Stream Improvement as Related to Pulp and Paper Mills," Russell Winget, exec. secretary, National Council for Stream Improvement; Dr. Harry W. Gehm, technical director, National Council for Stream Improvement; Harold Morris, Mobile Paper Co.

8:30 P.M. Movies: Georgian Ball Room
Walter L. Glass, F. C. Huyck and Sons Co., Georgetown, S.C.—Mill of Southern Kraft Corp.—Woodlands Film—Sports Film

Friday Morning, October 22

8:00 A.M. Joint Breakfast, Empire Dining Room
Entertainment by International Brotherhood of Migratory Peddlers

9:00 A.M. Meetings: Frank M. Jensen and L. M. Bauer, co-chairmen
Round Table Discussion: "Pulp Bleaching," Vernon Woodside, Mathieson Chemical Corp., Niagara Falls, N.Y.; R. L. McEwen, Buffalo Electrochemical Co., Buffalo, N.Y.; John Schuber, Solvay Process Div. of Allied Chemical and Dye Co., Syracuse, N.Y.
"The Growth of the Southern Newsprint Industry,"—Speaker to be supplied by Southland Newsprint Co.
"Oil—a Major Item in Pulp and Paper Mill Maintenance," John Hooten, Gulf Oil Co., Atlanta, Ga.

12:00 N. Separate Business Meetings and Election of Officers: Southern and Southeastern Divisions

12:30 P.M. Lunch where you will

Friday Afternoon, October 22

2:00 P.M. Golf: Bobby Jones Course—Atlanta (Under direction of Gene Bechard)

4:00 P.M. Visit to plant of Westinghouse Electric Corp. (This plant is a short distance from Biltmore Hotel)

7:00 P.M. Cocktail Party, Pompeiian Room—Courtesy Mill Suppliers Committee; George Hardaker and George Witham, co-chairmen. Entertainment by Harry Hulmes accompanied by Miss Charlotte Bishman

7:30 P.M. Banquet: Toastmaster, L. M. Bauer, Ecusta Paper Corp., Pisgah Forest, N.C. Entertainment by Harry Hulmes, accompanied by Miss Charlotte Bishman. Presentation of Golf Awards by Gene Bechard. Introduction of new officers and guests. Presentation of Chairman's Certificate, O. W. Messner, national president. Introduction of guest speaker: R. C. Bullock. Guest Speaker: Dr. Josiah Crudup, president Breneau College for Women, Gainesville, Ga.

9:00 P.M. until Midnight Dancing: Harry Hulmes, M. C. — Music by George Hefferman's WSB Orchestra

Saturday, October 23

No organized meetings — Football Game at Grant Field, 2:30 P.M. Georgia Tech. vs. University of Florida

NEW EQUIPMENT AND SUPPLIES

Stainless Steel Manometer

For measuring and controlling flow, liquid level or specific gravity of those applications which involve caustics or difficult acids such as sulphuric, acetic, nitric, phospheric, a new measuring device is an addition to the regular line of Aneroid Manometers made by the Taylor Instrument Companies, Rochester 1, N.Y.

The housing and all internal parts coming in contact with corrosive mediums are made of Type 316 Stainless Steel. Because corrosive fluids can be introduced directly into the manometer, no sealing fluids or purges are necessary.

The balancing agent is a torque tube to eliminate any need for liquid. The elimination of mercury prevents product contamination from this source and constitutes a definite process economy. Maintenance is cut to a minimum because there is no mercury to replace; no stuffing box, no internal parts to wear out. It is easy to clean because all areas are readily accessible. Available in ranges of 20, 50, 100 and 200 inches of water differential with a body pressure rating of 300 psi.

Electric Panel Tachometer

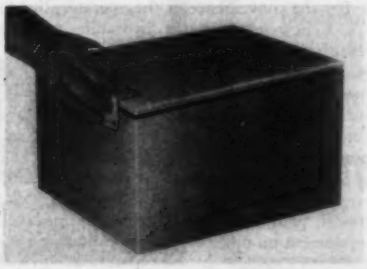
A new electric panel type tachometer for providing continuous, accurate speed measurements has been announced by the Crown Industrial Products Company, 1536 East 53rd Street, Chicago. This unit is designed for use on paper machines, machine tools or on applications where a variable speed drive is used and accurate determination of the output speed is required.

The unit consists of a pickup generator with a stationary armature and a small Alnico magnet rotor mounted on sealed ball bearings. There are no brushes or other wearing parts in the generator. A rectifier type meter with a D'Arsonval movement is used. This meter can be furnished in either 3" or 7" size and is regularly finished in 0-1250, 0-2500 and 0-5000 rpm ranges. The meter can also be furnished with suitable calibration to give feet per minute, gallons per minute, or any other unit for measuring speed. This tachometer has an accuracy of plus or minus 1%.

The small size of the generator pickup makes it adaptable to applications where there is not sufficient room for larger units. The diameter of the generator is 1⅜" and with the mounting bracket, the over-all height is 2½". The length, including shaft extension and electrical plug, is 4½". The generator can be connected to the shaft whose speed is to be measured by means of a flexible coupling, chain drive, or gear drive. The meter may be located as far as 200 feet from the generator, which means that in any application it can be placed where it can be easily read.

Box Opener

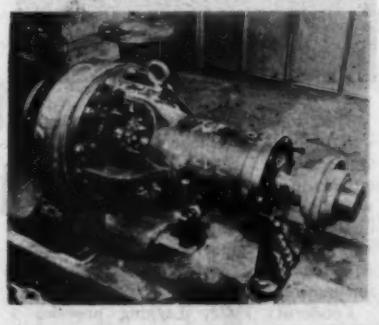
A new and patented box opener is announced by Flash Box Opener Co., Inc., 52 West Houston St., New York 12, N. Y. The *Flash Box Opener* protects contents of cartons because it penetrates exactly under the outer cover thickness. It cuts cleanly, permitting re-use. Flash Box Opener protects the user from injury. The Flash Box



Opener is made of durable zinc. It is designed for heavy duty and eliminates fatigue. It is the only carton opener with the exclusive patented blade holder that is speedily adjusted to cut varying thicknesses of carton covers.

Pulp Pump

A new pump for pulp stock or acid and liquor service has been designed by the Byron Jackson Pulp Company Pump Division, Vernon Ave. at Thomas St., Los Angeles. These pumps are available for capacities from 400 to 4,000 gpm, heads from 40 to 200 ft., and in seven standard pump sizes —3 in., 4 in., 5 in., 6 in., 8 in., 10 in., and 12 in. The company states with the BJ



Screw Feed Pump, these pumps handle from 6 per cent to 8 per cent consistency—the normal stock consistency range is up to 6 per cent.

BJ Pulp Pumps are single-stage, single suction, centrifugal pumps with double row radial and thrust bearing design. Conversion from pulp stock service to acid and liquor service, or vice versa, is accomplished by merely changing two or four pump parts. For hot service, the standard stuffing box can be replaced with a water-jacketed stuffing box. To make the change, a simple machining operation on the pump cover is required.

The pumps are manufactured in three groups with three to four sizes per group. Within each group, the bracket-shaft-bearing assembly and the back cover are identical. The bracket-shaft assemblies are also built to overlap these size groups so that one such assembly fits up to six sizes of pumps.

Shovel for Use on Fork Truck

A pneumatic snubber which minimizes the shock and strain to the upright assembly when the load is discharged features a new type of fork truck shovel attachment announced by Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

In addition to the snubber, the shovel has 3-point suspension, with a roller cam lock and a single point hook, which permits release of any load with a 15-pound pull.

The shovel is built of ¼-inch steel plate; with a blade 6 inches wide of specially hardened steel and flame hardened edge. The blade is welded to the bucket. The unit is readily interchangeable with forks and all other attachments mounted directly to the standard fork bars on Clark fork trucks. It is available for use on most models of Clark fork trucks.

Cylinder Seal

A new type cylinder seal offered by Cheney Bigelow Wire Works, Springfield, Mass., gives operators of cylinder machines and wet machines considerably longer felt life, less fiber loss and resultant contamination of white water.

The usual felt seal tends to brake the cylinder, according to Cheney Bigelow engineers, but the new type seal operates at much lower friction, hence eases the pull on the felt, reduces the stretch, and helps keep the felt open.

Because the Cheney Bigelow seal is a round neoprene reinforced seal, cylinder and vat rings of special design are required for its application. Vat chimes are furnished by

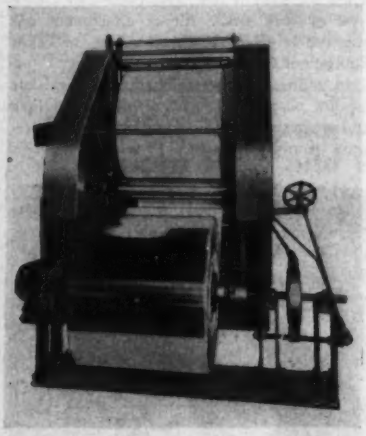
Cheney Bigelow for installation by the operator; chimes for head castings are installed by Cheney Bigelow on new and refinished cylinders.

In addition to its unusual sealing properties, the new seal is said to reduce washing-up time, since it is easily loosened before washing-up. Frequent replacements are unnecessary, because wear on the seal, which is self-lubricated by water, is negligible.

For those few instances where a wider trim in existing vats is desirable, this type of seal and chime offers a possibility in increasing trim 2 to 3 in.

Newly Designed Spooler

A precision-built synchronized paper spooler has been especially developed for slitting, trimming, and rewinding paper and laminated foil from 10 lb. tissue up to 10 pt. board. This spooler, developed by Wm. S. Kimball, engineer, 417-19 S. Eighth St., Louisville 3, Ky., is designated the *Kimball*



Hi-Speed Spooler. It operates at a maximum speed of 200 fpm. It has no gears and the operation is silent. The special rewind mandrel and inwind stand accommodate rolls 2 in. to 40 in. O.D. and multiple width cuts from a minimum of 2 inches upward. Special designs 16 in. to 120 in. widths, may be ordered for 90-day delivery.

Suspended Fork Model Stacker

A new model *Transtacker* which incorporates ten major improvements in its design, yet costs less, was announced recently by Automatic Transportation Company, 149 West 87th Street, Chicago.

Weighing only 3400 pounds, the suspended fork model is the most popular of the four types in Automatic's Transtacker line, the motorized hand truck counterpart of the fork truck.

An automatic tilt at carrying position is standard equipment on the suspended fork model Transtacker. Automatically cradling all loads, the tilt is one the operator cannot forget to use. An Automatic exclusive, it requires no additional working parts, motors or controls and helps to keep the price of the Transtacker down.

Completely electric powered, the Transtacker combines low initial investment and lightweight with the traditional dependability, freedom from fire hazard and fume-free operation of electric propelled trucks.

Road clearance has been raised two inches, now being four and five-eighths inches. Because the truck is also three and three-fourth inches shorter from the center line of the drive wheel to the fork face, better vision is provided for the operator.

For the convenience of the operator, there are a new repositioned hydraulic release lever and new push button controls making the truck easier to operate. In addition, a new hydraulic-lift motor and pump—a direct connected integral unit—replace the former separate motor and chain driven pump to provide more efficient lift.

The new tilt, as well as being standard equipment on the new suspended fork model, will also be available as optional equipment on other types of Transtackers.

Waterproof Lagging

An all-purpose waterproof lagging that is quickly and easily applied without rivets, bolts, or heat, and that dries within 10 hours at room temperature has been produced by the Condersite Engineering Corporation, 2015 Chancellor Street, Philadelphia 3, Pa.

This tough, wear-resistant, all-purpose waterproof lagging adheres so firmly to all surfaces that a hammer and chisel are required to remove it. In addition, it is weather and corrosion resistant, unaffected by sulphuric acid, oxidizing agents, soaps, alcohol, petroleum products, etc. When dry it is odorless, tasteless, nontoxic and noninflammable.

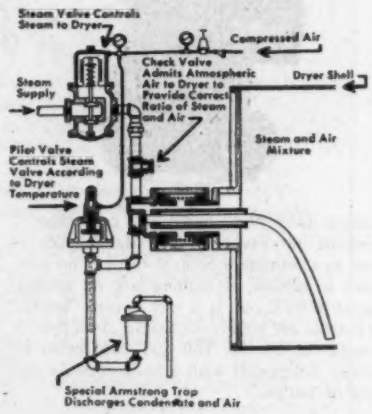
Condersite Pulley Lagging provides a superior frictional surface which increases transmission efficiency and belt life by eliminating belt slippage—saves power, time, labor and money. It is equally suitable for crown, split and flat pulleys—for use with leather cord, wire-woven, or rubber belts.

Individual Dryer Temperature Control

A new Individual Dryer Temperature Control, developed by Armstrong Machine Works, Three Rivers, Mich., employs the principle of a controlled mixture of steam and air to maintain reduced temperatures in the wet end dryers of paper machines. Temperature of each dryer equipped with a control is maintained independently of any other dryer in the machine. The manufacturer claims that by installing individual controls on each of the first four or five dryers the temperature of any sheet can be increased as slowly as required to prevent the sheet from sticking to the surface of the dryer and to eliminate curl or cockle due to overdrying on one side.

The control is also designed for use after the size press where, in addition to prevention of picking and curling, it is said to maintain fairly constant sheet moisture content due to the constant temperature maintained.

The Armstrong Control is based on the principle that when steam and air are mixed at atmospheric pressure, the temperature of the mixture will be that corresponding to the partial pressure due to steam. It is designed to regulate the flow of steam and air


Steam Valve Controls Steam to Dryer
Compressed Air
Check Valve Admits Atmospheric Air to Dryer to Provide Correct Ratio of Steam and Air
Dryer Shell
Steam Supply
Steam and Air Mixture
Pilot Valve Controls Steam Valve According to Dryer Temperature
Special Armstrong Trap Discharges Condensate and Air

to the dryer so that the partial pressure due to steam can be varied to give any desired temperature from 212 Fahr. down to 100 Fahr. Above 212 Fahr., all air is evacuated and the steam pressure is raised to give the desired temperature.

The system consists primarily of a compressed air operated steam control valve, a specially designed adjustable thermostatic pilot valve which actuates the steam valve according to dryer temperature and a check valve which admits atmospheric air to the dryer. As the dryer temperature rises, the pilot valve bleeds compressed air, thereby reducing pressure on the bellows of the steam control valve causing it to throttle. Conversely, a decrease in dryer temperature reduces air bleed and causes the steam valve to open wider.

If the condensing rate of the dryer exceeds the rate at which steam is being supplied, the pressure within the dryer tends to drop below atmospheric, causing air to be drawn into the dryer through the check valve, thus maintaining atmospheric pressure. With the pilot valve set for a given temperature, the mixture of steam and air

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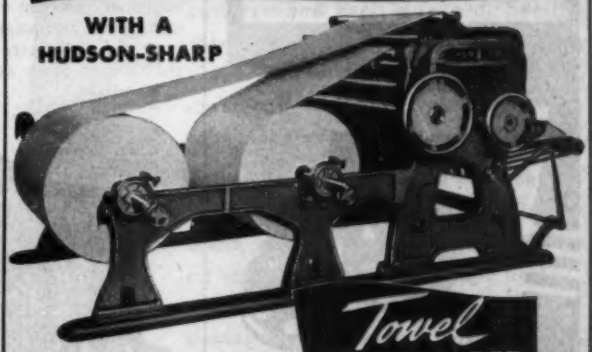

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BUILDERS of folders and interfolders for the paper towel industry since the product was originated, Hudson-Sharp machines have been improved and redesigned to meet the increased production speeds required for post-war demands. Write for complete information today.

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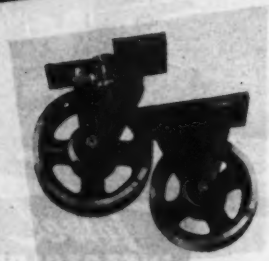

Free MANUAL

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LONG BEACH 4, CALIFORNIA

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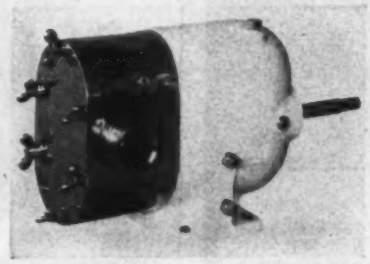
is thus automatically proportioned so that the partial pressure of the steam will result in the desired temperature. The check valve will always be closed if the dryer is being operated at pressures above atmospheric.

Stainless Steel Pump

A new stainless steel pump just announced by the Waterous Co., St. Paul,

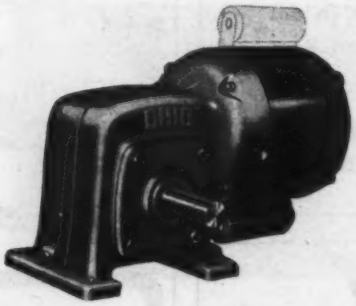


Minn., is designed to eliminate all internal threads. The pumps can easily and quickly be disassembled for cleaning, as they have a minimum of removable parts.

Motorized Speed Reducer

A new line of motorized speed reducers in 1/4 hp. and 1/3 hp. capacities is announced by the Ohio Gear Co., 1384 E. 179th St., Cleveland, Ohio. These are designated as series M-1400 and M-1300. Other capacities are being added to the line as they are developed.

These units are practical in design, attractive in appearance and soundly engineered for long service. Ratios are from 5:1 to 72:1; output from 317 rpm to 24 rpm. Output torque from 43 in. lb. to 354 in. lb. Housings are of special aluminum alloy. Worm gears are of special gear bronze, selected for greatest strength with a minimum coefficient of friction. Worm and motor shaft are integral, made of hardened steel and ball bearing mounted. Output shaft is extra heavy with ample bearing sup-



port. Out put shaft roller bearings are mounted in cast iron covers and input shaft bearing is mounted in cast iron carrier cap.

Two types of general purpose motors are available: capacitor type in 115 volt and 230 volt, also three phase type in 220/440 volt. They are precision built, of drip-proof construction. Cast-in terminal box permits easy wiring. Heavy duty ball bearings throughout. A special feature is the new *Torq Syncrosnap* starting switch which insures precise snap-action, and eliminates damage through burned-out windings. Capacitor may be mounted above or below motor as shown.

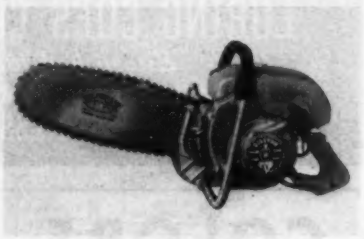
One-Man Chain Saw

A powerful, lightweight One-Man Chain Saw has been announced by Henry Disston & Sons, Inc., Philadelphia.

Especially useful for light felling and bucking, for limbing and construction timber cutting, the new saw is regarded by those who have used it as a real engineering achievement.

Special features of the saw, which has an 18-inch cutting capacity, include a 2-cycle, air-cooled Mercury gasoline engine delivering 3½ horse power at 4000 rpm. Full precision bearing construction insures trouble-free operation at any speed. A specially-designed fuel system permits operation at top efficiency even when the saw is used upside down for inverted bucking. A fuel meter assures positive flow of properly mixed fuel to the cylinder, at the same time functioning as a governor to control engine speed. The magneto, of the crankshaft type, is amply protected against moisture and dirt and assures positive ignition under all working conditions.

Like its two-man older brother, the Diston One-Man Chain Saw has a built-in automatic chain lubricator, which has only one moving part—a flexible pickup tube inside the oil reservoir. The lubricator operates



under pressure. This serves a dual purpose —virtually friction-free movement of the cutting chain and no clogging of the oil jet hole by dirt or sawdust.

Starting is made easy by the self-rewinding Magnapull Starter, which is built into the engine, and a liberal fuel capacity provides wide working limits on the operator's time.

Control of the new one-man chain saw is concentrated in a well-designed pistol grip handle. The throttle is at the operator's finger tip, with the fuel mixture control lever near by. A handy priming valve is provided for easy starting in extreme cold, or when the engine has been run dry. A squeeze on the handle disengages the clutch, and releasing a safety catch re-engages it.

Monel Sheet for Roofing Purposes

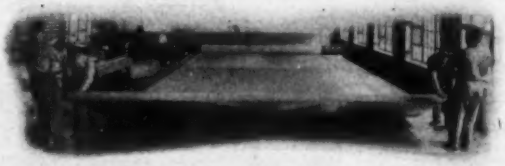
A new type of Monel sheet for roofing purposes has been developed by metallurgists of the Huntington Works of The International Nickel Co., Inc., New York City.

Based on experiences with earlier roofing installations of Monel, it is said that engineers estimate that roofs made of the material will last over 100 years, and that more than half a million pounds of the new product will be sold this year, with further increases in tonnage next year.

This new sheet has all the mechanical and corrosion resistant properties of the roofing sheet previously produced at Hunt-

. . . and, over the years, progress in the making of Fourdrinier wires and paper has been just as great.

Inspection on the springing table is carried out with extreme care at Lindsay.



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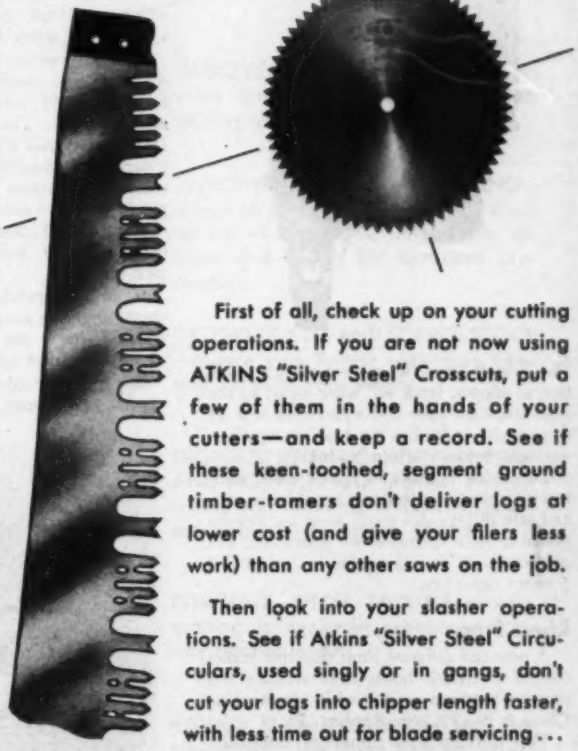
Lindsay **WIRES**
FOR PAPER MILLS

HOW TO PUT YOURSELF TWO JUMPS AHEAD of rising pulpwood costs



First of all, check up on your cutting operations. If you are not now using ATKINS "Silver Steel" Crosscuts, put a few of them in the hands of your cutters—and keep a record. See if these keen-toothed, segment ground timber-tamers don't deliver logs at lower cost (and give your filers less work) than any other saws on the job.

Then look into your slasher operations. See if Atkins "Silver Steel" Circulars, used singly or in gangs, don't cut your logs into chipper length faster, with less time out for blade servicing . . . Making this double check has cut costs for scores of producers. It can do it for you, too . . . and you'll accept nothing less than an "Atkins" on all your orders for Crosscuts and Circular Saws.

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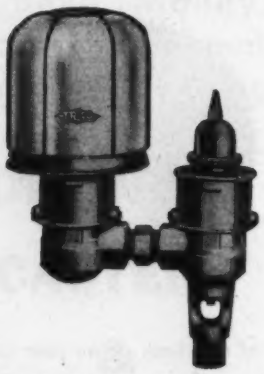
ington except that it is softer in temper and lends itself more easily to the various bending, forming, seaming and soldering operations required for roofing purposes, thus cutting fabrication and installation costs. It is available in standard roofing thicknesses.

Gravity-Feed Oiler

A new precision oiler for solid bearings where an accurate rate of feed and clean, filtered oil are essential, is made by Trico Fuse Mfg. Co., 2948 North 5th Street, Milwaukee, Wis.

The oiler, named *Trico Gravity Feed Oiler,* is mounted at the top of the part to be lubricated and any predetermined number of drops of oil can be obtained by a simple adjustment of the needle valve. After the desired adjustment is made, no further attention is required except to keep a reserve supply of oil in the large capacity bottle.



The shutoff lever, when in a vertical position as shown, feeds oil, when tilted to the side, stops the flow and when held at a 45 deg. angle, it flushes the bearing which is desirable before starting machine.

The bottle is made of crystal clear, shatterproof plastic material, removable for easy and safe filling. All metal parts are heavily plated to resist corrosion, for appearance and easy cleaning. It is available in 1, 2, 4 and 6 ounce capacities.

Limit Stop

A new and different limit stop that makes control of electric hoists more accurate and positive has been announced by the Reading Chain & Block Corp., Reading, Pa.

This development eliminates difficulties encountered on angular pulls with paddle type limit stops. Users of ½ and 1-ton Reading Electric Hoists equipped with the new limit stop claim that control is made more accurate and positive. The result is a more streamlined appearance because the limit mechanism is entirely enclosed within the hoisting unit.

According to the company, the new mechanism also simplifies adjustments and the setting of limit stops. In addition, bulky operation rods are eliminated.

Thermoplastic Matting

A new thermoplastic matting for use in industries, office buildings, institutions and homes is announced by The B. F. Goodrich Company, Akron, Ohio.

The matting has tremendous abrasion resistance and thus should serve exceptionally well in places where it is given rigorous service, the company claims. It will prove especially valuable in applications where acids or oils are present, resisting these agents which are usually destructive to rubber.

Because of its thermoplastic nature the new matting will lie flat and hug the floor, conforming to irregular surfaces and contours much better than rubber.

Made in black and brown, the matting is 3/32 inches thick by 36 inches wide and is supplied in rolls from 25 to 35 yards.

Quick Reference Safety Dial

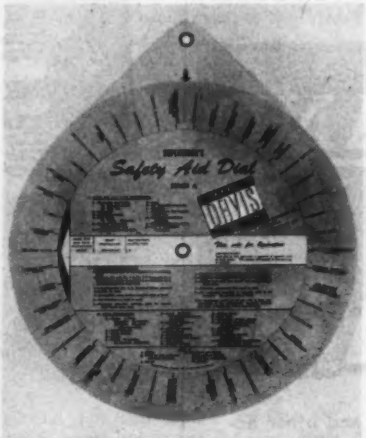
A new *Davis Safety Aid Dial* introduced by Davis Emergency Equipment Co., Inc., 45 Halleck St., Newark 4, N. J., is a ready reference and aid to any one connected with safety from the foreman on up to the manager of the safety department.

The dial gives safety men a quick reference for many of the daily hazard problems which would take hours of time consulting a number of safety manuals and text books.

Foremen who use the dial can readily find the answers to many safety problems which formerly could only be answered by the safety director. There are two sides to the Davis Safety Aid Dial. The operation side covers the following: (1) 45 different mechanical operations in industry; (2) Suggested head, eye and face protection for each operation; (3) Body protection for each operation; (4) Respiratory protection for each operation.

If, in any operation, some harmful substance might be used, an indication is given which refers to the other side of the chart where substances are listed.

The substance side lists 55 different fumes, vapors, gases, dusts, etc., and gives the following information about each: (1) Probable safe concentration for an 8-hour exposure; (2) Suggested protection and control measures; (3) Usual method of entrance to the body; (4) Flash point; (5) Lower explosive limit.



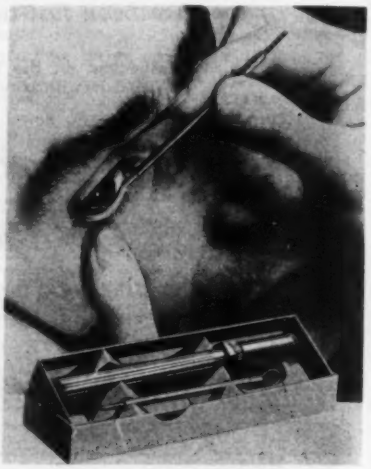
There are, in addition, a canister color chart and a listing of the uses and limits of various types of gas protective equipment.

All the information contained on the Davis Safety Aid Dial has been accumulated from authoritative sources.

The dial is printed on heavy coated cardboard. Quick easy reference is obtained by turning the inner dial until the arrow points to the problem. Answer references are then shown in the window cut out. Dials are eyeletted for hanging in convenient places.

Eye Sweep

Wherever industrial accidents occur, and especially where workers are exposed to flying metallic fragments, filings or other foreign metal substances subject to magnetic attraction, the General Scientific Eye Sweep is an indispensable unit of first aid. It is a handy, convenient instrument for clinic, hospital and physician's office. The G-S. Eye



Sweep, economically priced, is available from the General Scientific Equipment Co., 2700 W. Huntingdon Street, Philadelphia 32, Pa.

One end is fitted with a magnet for removing steel splinters, while the other is fitted with a flexible loop for removing cinders, dust and other particles. Sterilization of the instrument will not diminish the magnetic qualities nor affect the loop. A hard rubber carrying case is provided with each Sweep.

Agitated Reactor

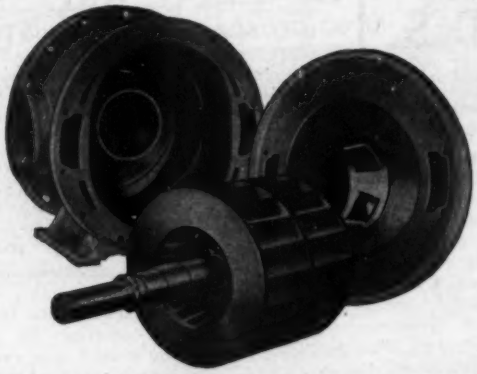
Industrial Process Engineers, 5260 Hudson Avenue, West New York, New Jersey, announce *Standard-Plus Agitated Reactor* for specific needs which includes the processing of synthetic detergents, insecticides, resins, adhesives, glue, fine chemicals, cellulose products, dyes, plastics, and many other products.

This unit is made in compliance with the A.S.M.E. Code for any weldable material such as steel, stainless steel, monel, nickel, inconel and clad steel with any of these materials.

All necessary equipment for particular requirements are provided. Included are direct or indirect heating by oil, gas, steam, electricity or Dowtherm; heat exchangers, condensers, receivers, piping and valves.

Special consideration is given to the correct type of agitation to achieve best results. Turbine, propeller, anchor and paddle agitation, depending on the processing problem, are furnished. Variable speed agitators can be used when the viscosities change during processing.

SIMPLICITY



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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Semichemical Pulps from Beech Wood

The author, who is on the staff of the French School of Papermaking at the University of Grenoble, compared three semichemical methods for pulping beechwood. In the case of a soda cook, 10% NaOH was used on the weight of the wood. In a sulphate cook 8% NaOH and 2.05% Sodium Sulphide were used and in the modified sulphite digestion 10% sodium sulphite and 5% sodium bicarbonate were used. In all cases 2500 cc. of the liquor and one kilogram of wood (on the dry basis) were used and the maximum temperature (150 C.) was maintained for 3 hours and was reached in about 2 hours. The respective unbleached pulp yields obtained were 75.1% (soda semichemical), 72.4% (kraft semichemical), and 80.7% by the sodium sulphite digestion. The corresponding bleached pulp yields were respectively 49%, 50.4% and 56.5%.

When these cooks were compared with normal soda and kraft cooks, there were marked decreases in the yields of unbleached pulps, but in the case of the bleached pulp from the normal soda cook, the yields were almost as high (48.6%) as those obtained from the semichemical treatment. On the other hand the regular bleached kraft pulp yields from beech were markedly lower than by the semichemical process. Semichemical kraft pulps prior to bleaching showed the greatest over-all strength properties, and this was especially noticeable in the case of burst and folding endurance. However, when the pulps were once bleached, these differences in the three samples tended to disappear. The bleach consumption was highest in the case of the semichemical sulphate cooked pulp.

The bleached pulps were definitely stronger than were the corresponding unbleached samples. Bleached neutral sulphite pulp hydrated more rapidly than did the other pulps, and showed greater greaseproofness and also greater brightness. By the processes described, superior pulps may also be obtained from birchwood. H. Bouchayer. *Papeterie* 70, 162-3, 165, 167, 169 and 171 (1948) (In French).

Strength of Paper

When paper strength is evaluated, usually the burst or the breaking length of the sample is taken as a criterion. Tear resistance is seldom specified. The author asks and tries to answer the following pertinent questions: (1) Is there a relationship between burst and breaking length, so that either test may be used? (2) If such a relation exists, does either of these properties serve to characterize a paper or pulp? (3) If not, can the tear resistance be used for this purpose?

In 1931 (Bureau of Standards J. Research 6,339-53) Carson and Worthington showed that there was a relationship between breaking length and burst and their findings have, in the main, been confirmed. However there are exceptions and those require further study. The present author shows that tensile strength alone cannot be considered a reliable criterion for paper strength. Newsprint is cited as an example in which the strength is correlated with the amount of groundwood in the pulp.

On the other hand, many tests indicate that the tearing strength of a sulphite pulp serves as an index of paper strength (as in newsprint). For example such pulps with an Elmendorf of over 140, can be considered a very good one whereas Elemendorf figures below 90 indicate that the pulp is poor. The corresponding figures for mechanical pulp of 50 and 25. Inasmuch as the Elmendorf tear tester is not sufficiently sensitive to be used with groundwood pulp, a dynamometric method has been used in its place.

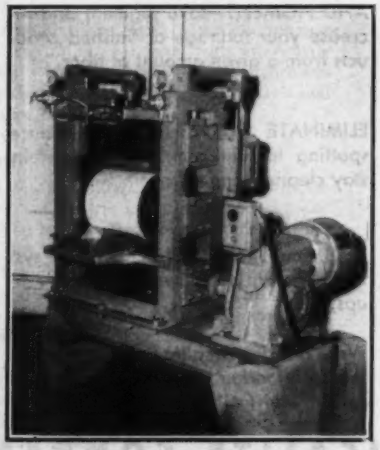
The author points out that in gaging pulps it is very important to state just how these pulps are to be used, so that the type of strength essential for the paper can be determined. J. Vilars. *Bull. Assoc. Tech. Ind. Papetiere* 1, 95-9 (1947). (In French).

Possible Uses of Annual Plants in Kraft Pulping in Germany

The authors examined well over 30 possible annual plants, among which were heather, various lupines, goldenrod stalks, grapevine stems, nettle stalks, yucca and hemp (the latter being a product of agricultural crop failure), hopvines and spent hops, Jerusalem artichoke stalks, reeds, oathulls, castor-oil plant roots and stalks, sorghum stalks, rye and wheat straws, tobacco stalks, Scotch thistle (leaves and stalks), cornstalks, pressed fruit residues, etc. These possible raw materials were analyzed and compared with young (one-year old) aspen shoots, both barked and unbarked. In many cases, photomicrographs are included, which will serve in the future in a fiber atlas.

The authors give the source of their raw materials, and the ash, pentosan, and lignin contents. These varied greatly. For example the lignin ranged from about 14% for waste hemp to 35.6% for yucca fiber waste. Under conditions of pulping that gave maximum strength pulps, the authors determined unbleached kraft pulp yields. These varied from about 17.8% for Jerusalem artichoke stalks to about 53.1% for potato tops. In most cases they determined the maximum cooking temperatures, time held at this maximum temperature, the residual lignin content of the pulp (which ranged from 0.51% in sorghum stalks to 10.7% in the woody part of vines), and the alkali concentrations used in the various cooks.

Twenty Years of Experience...



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GARLOCK 22 Red Rubber Sheet Packing

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GARLOCK 660 Cork-Fibre Sheet Packing

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GARLOCK 7021 Compressed Asbestos Sheet—exceptionally strong and tough. Gives superior service against gasoline, oil, gas or steam at high temperatures and extreme pressures.

GARLOCK 22 Red Rubber Sheet Packing—finest quality. Specially recommended for hot or cold water and low pressure steam joints.

GARLOCK 660 Cork-Fibre Sheet Packing combines granulated cork and vegetable fibre into a strong compressible sheet, treated with an oil resistant binder. An ideal gasketing material for oils and solvents at temperatures up to 212° F.

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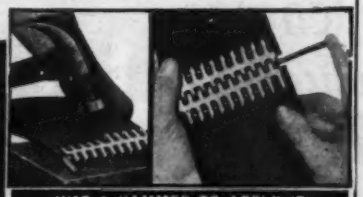

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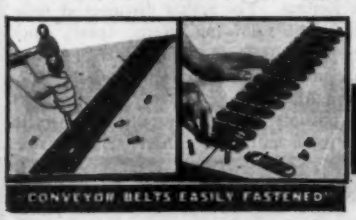
For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses everywhere



FLEXIBLE STEEL LACING CO.
4606 Lexington St.
Chicago 44, Illinois

In using these data, the authors developed certain expressions. For example the "degree of pulping" ("Aufschliessbarkeit") they define as (the maximum temperature reached in the cook plus five times the digestion period at this temperature) multiplied by the residual lignin content and by the sodium concentration of the kraft liquor. This degree of pulping varied very widely. The most easily pulped raw material (sorghum stalks) being the lowest and Jerusalem artichoke stalks showing the highest figure. The most readily pulped material showed the lowest figure. In the case of unbleached pulps, beaten to about 65 deg. Schopper-Riegler, breaking lengths, folding endurance, and Brecht-Imset tear-through were determined, and here there were also enormous variations. In general, the fiber lengths of the various pulps were quite low, the exception being hemp pulp.

The authors also computed the strength quality numbers, which were greatest for unbleached castor plant root stock pulp and aspen-shoot pulp. The relationship between mean fiber length, and strength quality numbers (as well as between fiber length and breaking lengths, folding endurance, and through tear) have been shown graphically. Various new mathematical relationships are explained and applied.

When the various crude kraft pulps were bleached there were marked differences in chlorine consumption. The highest bleach requirements were those of lupine, tobacco stalk, and reed pulps, whereas sorghum stalk pulp and oat hulls showed the lowest bleach consumption. Sorghum pulp also gave the highest brightness figure. In the case of bleached pulps, pentosans and alpha-cellulose were determined, as well as the breaking lengths, tear-through and folding endurance of the products. The highest over-all strength and quality number was shown by castor bean stalk (bleached) pulp.

The various data are given in about 20 tables. The authors emphasize the fact that these are incomplete, despite the great amount of work which they represent. All-in-all the results are disappointing. Many of the products (such as potato tops, reeds, hop vines and spent hop residues, pressed fruit residues, Jerusalem artichoke, thistle, heather, yucca fiber waste, oat hulls, golden rod and the lupines) are certainly not well suited to kraft pulping. Usually the cereal straws are the most satisfactory, although they are exceeded by sorghum and cornstalks, which however are not sufficiently prevalent in Germany to be considered very seriously. Other annual plants (while not too satisfactory), in an emergency, might give substitute pulps. Aspen shoots are not as satisfactory as aspen wood for pulping. Thus the authors place the emphasis on the cereal straws. On the other hand with the ascendency of furfural manufacture, and its enhanced use in plastics, those annual plant residues that give high pentosan values might be important raw materials in this field. Georg Jayme, Klaus-Günther Hindenburg, and Marianne Hardens-Steinhaüser *Papier* 2, 45-56; 95-105 (1948) (In German).

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Transportation of Wood and Pulp in Pulp Mills

Mechanization of all handling in the mill is discussed. The advantages over manual handling is emphasized. The manner in which logs arrive in the mill or in which pulp bales are shipped out, will often be a decisive factor in determining whether batch operations, with cable cranes, traveling cranes, lorries or different types of trucks, or whether continuously working conveyer systems are to be used.

With increasing mill capacities, intermittent transportation can only be used up to a certain practical limit. On the other hand continuously working conveyor systems have nearly unlimited handling capacities. They require practically no supervision and can be designed to work automatically. The future aim of Scandinavian mills should be complete mechanization. Erik Widén. *Norsk Skogindustri* 2 No. 4, 105-11 (1948). (In Swedish); through *Bull. Inst. Paper Chem.* 18, 764 (1948).

Paper Structure Revealed by Chemiluminescence

Hydrogen peroxide luminescence penetrates paper to quite a depth, and the author has used this reaction in studying certain paper characteristics. When hydrogen peroxide diffuses and decomposes and is thus allowed to react with a photographic film or plate covered with the paper sample, the structure of the paper is made visible and the structural differences of such materials as banknote, news, writing and cigarette papers become clearly evident. The method can also be applied to textiles.

Watermarks can be clearly discerned. When the paper has been printed upon or impregnated with certain dyes or metallic compounds, exposure to hydrogen peroxide shows such marked contrasts that the author suggests that his method may prove useful in detecting alterations in documents. However he also points out that ordinary printing inks are readily penetrated and that the printing on newsprint is not shown on the film or plate. P. M. Kretschner. *Wochbl. Papierfabr.* 76, 35-7 (1948). (In German).

High Speed Conical Refiners

The author discusses the variables that deserve study in modifying the refining operation with high speed conical refiners (especially those used in American practice and operating at 800-1800 rpm). Such refiners were compared with ordinary jordans especially with respect to the "stator effect" (which is a function of the centrifugal force developed in the pulp mass during the refining process). This effect was evidently greater in the high speed refiners than in the jordans. The author discusses at some length the following effects: speed, stock density, constriction at the outlet of the refiner, and the number of knives on the plug. Using schematic figures, the author shows the possible points of installing refiners in the paper mill. J. Schaar. *Bull. Assoc. Tech. Ind. Papetiere* 2, 75-81 (1948) (In French).

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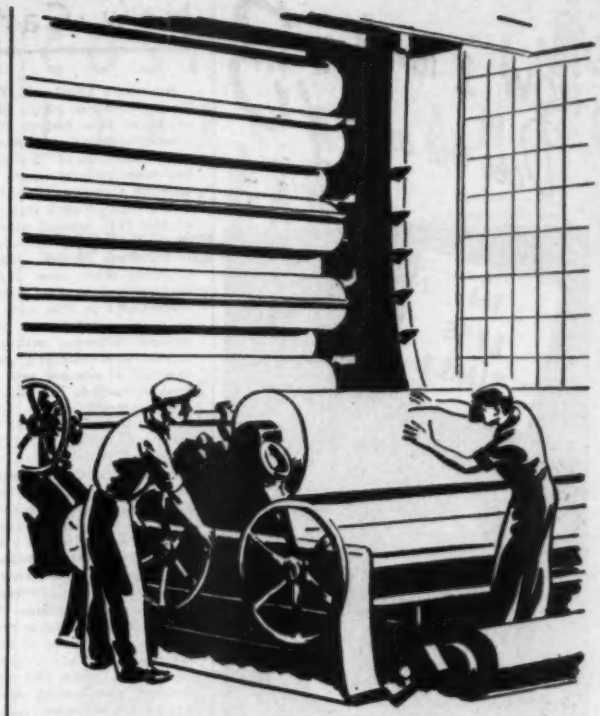

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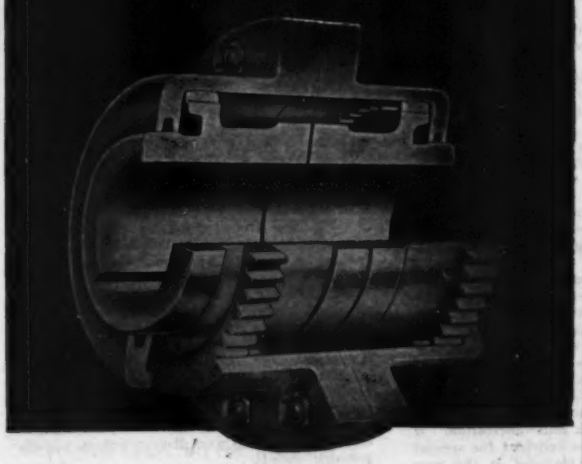

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American Lumber & Treating Company, 332 South Michigan Ave., Chicago, Ill.—The most extensive case history file maintained by any wood-preserving company—the service records on installations of "Wolmanized" treated wood—has been brought up to date by this company and its contents summarized. The first published data on such installations were presented at the 1941 annual meeting of the American Wood-Preservers' Association. New and supplementary records, made during 1946-1948, covering more than 34,000,000 board feet of Wolmanized treated lumber in service have been added in this new report. Detailed files on such varied classes of installations as wet-process factories, railroad structures, bridges, refrigerated buildings, etc., show that less than one-half of one per cent of all the lumber covered by records has failed because of decay or insect attack. Over 10,000,000 board feet of the 34,000,000 foot total is between twenty and twenty-five years old. These figures show that where properly treated wood is used in hard-service installations, nearly ten times as much of it will be removed because of wearing out, storm breakage, reconstruction or abandonment as will be damaged by rot or termites. Copies of this report may be obtained free of charge from the Technical Department, American Lumber & Treating Company, 332 South Michigan Avenue, Chicago.

Armstrong Machine Works, Three Rivers, Mich.—Now available from this company is a circular descriptive of its new individual dryer temperature control. An explanation is given of how the steam and air ratio is controlled to produce the desired dryer temperature. Diagrams are included. Ask for Bulletin No. 187.

Chemical Division, The Borden Company, 350 Madison Ave., New York 17, N. Y.—A helpful booklet for choosing the right glue for the job has been issued by this company. It describes industrial uses for glues for case sealing, labeling, sealing waterproof papers, case liners and overcoating of labels. It also gives complete technical details on products manufactured by this division. Uses are given for all adhesives from the low-cost dextrin type for regular packaging to medium-priced water-resistant government adhesives. Army and Navy specifications are included, together with adhesives recommended. Write for Technical Service Bulletin No. 63A, Liquid Department, Chemical Division, The Borden Company, 350 Madison Avenue, New York 17, N. Y.

Cochrane Corporation, 17th Street and Allegheny Ave., Philadelphia 32, Pa.—This company has announced the publication of a four-page specification bulletin on its new "CBA" high differential high pressure condensate return systems. Added to material and operating specifications, capacity ratings are given for the six different sizes available—3, 5, 7½, 10, 15 and 25 hp.—based on a maximum of 200 psi pressure differential. Differential pressures of from 50 to 200 psi are listed and capacities for each unit are tabulated after each differential pressure for unit inlet pressures varying from 0-39 psi, 40-99 psi and for over 100 psi. A two-page dimensioned drawing in color shows the design and construction of the new unit. Write above company for Publication 3250-1.

Eutectic Welding Alloys Corporation, 40 Worth St., New York 13—A comparison of the Eutectic Low Temperature Welding Alloys with welding and brazing process is contained in a new eight-page bulletin, with over 60 illustrations. An explanation is given of how 5 of the most popular alloys can save defective equipment and machinery, and how the process of low heat welding is used to the best advantage in construction work and fabrication. It also tells how to select the rod best for special welding problems. Also featured is the new cutting electrode, "Cutrode." Detailed instructions are given for the use of each alloy. Ask for Illustrated Production Issue, EW-7.

Hardinge Co., Inc., 240 Arch St., York, Pa.—A twelve-page equipment bulletin, just issued by this company, gives a complete description and specifications of their beam-type, circular clarifiers; center-column type, circular clarifiers, and rectangular clarifiers for skimming and sludge collecting. It also describes their line of digesters, automatic backwash sand filters, flocculating equipment and rotary dryers. These clarifiers have been installed for treating liquid waste from paper mills. Ask for Bulletin 35-C.

Hercules Powder Company, Wilmington, Del.—An attractive booklet with a cover coated with a Parlon-base lacquer, has been issued by this company, as a revised edition of a technical book on Parlon, a chlorinated rubber. It contains information on the use of Parlon in printing inks, protective coatings, paper coatings and other applications. Standard formulas for paper coatings and a table listing materials useful with Parlon in paper lacquers are included. Technical information on the general properties of Parlon is also included.

The Jeffrey Manufacturing Company, Columbus 16, Ohio—Now available from this company is Catalogue No. 808, which describes its steel thimble roller drive chains. The sixty pages include photos showing the making of the chains and also applications of the finished products. Many useful tables are included.

Logemann Brothers Co., Milwaukee, Wis.—In Bulletin No. 196 are described the advantages, features and construction of this company's baling presses, which are of special interest to paper manufacturers. A table of standard sizes includes both the one-floor and the two-floor types.

Oakite Products, Inc., 22 Thames St., New York 6, N. Y.—An illustrated twenty-four page booklet just issued by this company gives a thorough-going account of how specialized cleaning and related materials and the latest methods of application are helping to establish production advantages and operating economies in pulp and paper mills throughout the United States and Canada. This helpful booklet may be had by writing to the company at 16 Thames St., New York City 6.

Paper and Industrial Appliances, Inc., 122 E. 42nd Street, New York City 17, New York.—A bulletin just released by this company describes its new horizontal space-saving arrangements for B. K. Reaction Chamber as used with the Chemipulper. In addition to diagrams a table of operational advantages and construction features is included.

Resinous Products & Chemical Company, 222 W. Washington Square, Philadelphia 5, Pa.—The July, 1948, issue of "The Resinous Reporter" has been devoted to ion exchange. This twenty-four page booklet is one of the most complete and graphic compilations of ion exchange technology and information ever issued. It was published because of the recent development of four new absorbents. A complete description of the process, chart and tabular presentations of operational data; concise applicational data; a glossary of eighty-five terms and complete bibliography are included. Sections are devoted to operations in which ion exchange resins have distinguished themselves, such as the purification of water. Copies are available.

Ross Heater & Mfg. Co., Inc., 1407 West Avenue, Buffalo 13, N. Y.—Just published by this company is a new bulletin showing its line of shell and tube heat exchangers. The illustrations are accompanied by elaborate cutaways and interior views, also brief texts on design, construction and uses. Ask for Bulletin No. 4300.

SKF Industries, Inc., Philadelphia, Pa.—An abridged edition of its general catalogue on ball and roller bearings is available. It includes a special section dealing with various types and sizes of pillow blocks made by the company, with data on their mounting, lubrication and maintenance. The seventy-six page booklet gives considerable space to engineering principles. It is being distributed through the company's branch and district offices and distributor outlets.

Books

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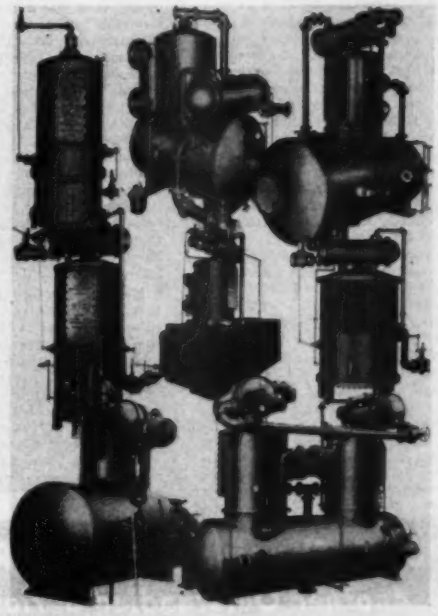

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Commercial Timbers of the United States—Written by H. P. Brown and A. J. Panshin, this volume replaces "Identification of the Commercial Timbers of the United States," by the same authors, in the American Forestry Series. Wood anatomy and distinguishing features of various types are covered in detail, with information on structure, properties, and uses of each. There are two identification keys, 71 pages in all. One is based on features visible with the naked eye and hand lens (10 times), the other on minute features. The first key is illustrated with photographs across the grain at low magnification; the second has photomicrographs showing the ray crossing of confers and the nature of the intervessel pitting in hardwoods. This 554 page book, with 311 illustrations, gives a complete view of commercial woods, and will meet the most exacting needs of forestry workers, plant anatomists, and others whose study of woods for scientific or practical purposes must be detailed and of most authoritative materials. The price is $5.00, from the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N.Y.

Forest Evaluation, with Special Emphasis on Basic Economic Principles—Sound sure methods of appraisal are given in this book, written by Herman H. Chapman and Walter H. Meyer. Eighteen chapters cover everything from economic principles which influence forest valuation, the law of diminishing returns, and the marginal tree, to the relation of production costs to profits, appraisal of damages, and determination and application of conversion returns. Discount is presented as the key to sound appraisals of value. There are 48 helpful tables. Standard methods used by the U.S. Forest Service for stumpage appraisal are given, and newly-adopted ratios are explained and illustrated. Methods for analyzing forest stands by species and log and tree classes, in order to determine where the margin or limit lies between profitable trees and submarginal units, are given. The book has 521 pages, 48 tables, 21 figures. The price is $6.00, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, 18, N.Y.

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Modern Plastics Encyclopedia (1948)—The new edition of this book has just been published and is more comprehensive than any of the other previous issues. The present volume contains 1,667 pages, and there is a separate package of 12 technical charts. One of the most interesting features is the first 64 pages which illustrate 122 entirely new plastics products in a wide variety of fields. Each product is accompanied by a detailed explanation of the application, the material used, how it was made, and the advantages of using plastics. The book incorporates for the first time the Catalog of Plastics Stock Molds T which was last published in 1944. The section illustrates over 2,000 products for which stock molds are available. The properties of plastics are covered and divided into physical, mechanical, thermal, electrical, and chemical, and there is complete information on A.S.T.M. test methods. A complete directory of 129 pages, which tells where to buy materials, machinery, supplies, and services, is also included. The directory lists molders' and fabricators' marks and lists the company names, addresses, and personnel of the firms in the plastics industry and the equipment they have available. The encyclopedia is the only complete authority in the world on all types of plastics. This year's edition is the same price as the previous one, even the $5.00 book of stock molds has been added to it. By popular request the new book is bound in one volume instead of three, and the complete volume, including the charts, sells for $8.50, prepaid. No reprints of any section of the new book will be available. For more information write to Modern Plastics Encyclopedia, 122 East 42nd Street, New York 17, N.Y., Attention: Mr. John G. Kasten.

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Proceedings of the Forest Products Research Society (Volume I)—This volume of 340 pages incorporates the papers and discussions presented at the First National Meeting of the Society held in Chicago on October 31 and November 1, 1947. The papers are supplemented with numerous illustrations. It also includes: record of attendance at that meeting; monthly bulletins of the Society, May, 1947, to October, 1947, inclusive; Articles of Association and Bylaws; style standards; alphabetical and geographical directories of membership. The volume is for sale at $6.00 per copy. Orders should be addressed to Thomas R. C. Wilson, Secretary-Treasurer, Forest Products Research Society, P. O. Box 2010, University Station, Madison 5, Wis.

The Pulping of Southern New England Hardwoods, Bulletin No. 20—This 26-page booklet contains the substance of a paper presented to the recent annual meeting of the Technical Association of the Pulp and Paper Industry, by Robert S. Aries, Technical Director, Northeastern Wood Utilization Council. The pulping tests made on typical mixed hardwoods from southern New England indicated that they are especially suited for corrugated paperboard, the neutral sulphite semi-chemical processing being found superior. Tables on pulpwood supply, container market, analysis of hardwoods, and results of pulping tests are included. The price of the book is $1.00, and it is available from Northeastern Wood Utilization Council, P. O. Box 1557, New Haven 6, Conn.

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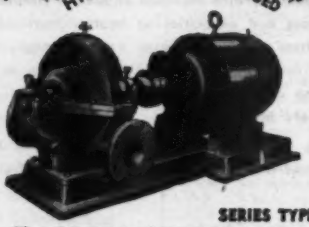

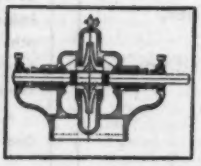

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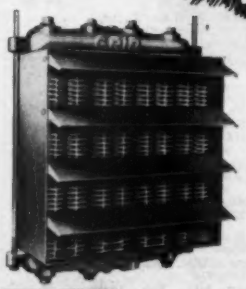

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LEWELLEN *Variable Speed* **MOTOR PULLEY**

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Blue Overalls	8.75 to 9.00
Corduroy, Men's	6.25 to 6.50
Corduroy, Ladies'	6.25 to 6.50
Washables, No. 1	5.00 to 5.25
Percales	7.25 to 7.50
Light Prints, No. 1	7.25 to 7.50
Khaki Cuttings—	
Bleachable	7.00 to 7.25
Unbleachable	6.25 to 6.50
New White Canvas	12.50 to 13.00
New Mixed Blacks	5.50 to 6.00
Canton Flannels, Bleached	11.00 to 11.50
Shirt Cuttings—	
New White No. 1	11.00 to 11.50
White Shrunk	10.00 to 10.50
Silesias No. 1	8.50 to 9.00
New Unbleached	11.25 to 11.75
Fancy	6.25 to 6.50
Linen Cuttings—	
American	8.50 to 9.00
White	14.50 to 15.50
Grey	13.50 to 14.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

Roofing—	per cwt.
No. 1	1.60 to 1.65
No. 2	1.50 to 1.55
No 3 and No 4	1.30 to 1.40
Twos and Blues—	
Repacked	3.25 to 3.50
Thirds and Blues—	
Repacked	2.00 to 2.25
Miscellaneous	2.50 to 2.75
Whites, No. 1—	
Repacked	4.75 to 5.00
Miscellaneous	4.00 to 4.25
White, No. 2—	
Repacked	3.75 to 4.00
Miscellaneous	2.00 to 2.25

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	7.75 to 8.25
Wool Tares—	
Light	8.00 to 8.25
Heavy	8.50 to 8.75
No. 1 Scrap Bagging	7.25 to 7.75
Manila Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.00 to 5.25
Sisal Rope—	
No. 1 large	5.50 to 5.75
No. 1 small	5.00 to 5.25
New Burlap Cuttings	8.00 to 8.50
Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	5.00 to 5.25
No. 2 sisal	4.50 to 4.75
Soft jute	4.25 to 4.50
Mixed	2.50 to 2.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

Shavings—	per ton
Hard White Env. Cuts	130.00—
Hard White, No. 1	110.00—
Soft White No. 1	90.00—
Soft White, One-cut	110.00—
Soft White, Misc.	80.00—
Fly Leaf, No. 1	55.00—
Fly Leaf, Woody, No. 1	40.00—
No. 2 Mixed Col. Woody	30.00—
Flat Stock—	
No. 1 Heavy Books and Magazines	23.00 to 25.00
Mixed Books	18.00 to 19.00
Ledger Stock—	
No. 1 white	75.00 to 80.00
No. 1 Mixed (Colored)	50.00 to 55.00
Manilas—	
New Env. Cuttings	90.00 to 100.00
New Env. Cuts, One-Cut.	—
Extra Manilas	—
Manila Tab Cards, Free of Ground Wood	90.00 to 95.00
Colored Manila Tab Cards	55.00 to 60.00
Kraft—	
New Envelope Cuttings	90.00 to 100.00
Tripled Sorted No. 1 100%	50.00 to 55.00
New 100% Cor. Cuts	55.00 to 60.00
No. 1 Old Assorted	35.00 to 40.00
News—	
White Blank	70.00 to 75.00
Overissue	18.00 to 19.00
No. 1 Baled	14.00 to 15.00
Old Corrugated Containers	15.00 to 16.00
New Jute Corrugated Cuts	24.00 to 25.00
Mill Wrappers	20.00 to 21.00
Box Board Chips	9.00 to 10.00
No. 1 Mixed Paper	9.00 to 10.00

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25—
Ground, cwt.	4.00—
Powdered, cwt.	4.40—
Blanc Fixe—	
Pulp, bulk, ton	77.50—
Dry, barrels	85.00—
Bleaching Powder—	
Drums, cwt.	3.25 to 4.25
Cassia (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	30.00 to 31.00
Argentine, lb.	26.50 to 27.50
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	15.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.40 to 2.70
Gelatine (silicin), lb.	1.60 to 1.85
Glue, (C.P.) drums, lb.	39½ to .40
Litharge, powd., bbl., lb.	19¼ to .20¼
Rosin (Gum)—	
New York, per 100 lbs.	
E	8.00—
F	8.00—
G	8.25—
WW	8.45—
Rosin (Wood), carlots	7.45—
Salt Cake—	
Dom. bulk (wks) ton	24.00 to 28.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	25.00 to ——
Soda Ash—	
Bulk (works), cwt.	1.10 to 1.20
Paper Bags, cwt.	1.30 to 1.40
Barrels, cwt.	1.50 to 1.60
Soda (Caustic)—	
Solid drums, cwt.	2.85 to 3.05
Ground and flake, drums, cwt.	3.25 to 3.50
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	7.60—
Pearl, barrels, cwt.	7.00—
Paper, (8p.) bags, cw.	7.00—
Powdered, barrels, cwt.	7.12—
Sulphur (Crude)	
(Mine) bulk, long ton	16.00 to 18.00
Talc—	
Dom. 100 lb. bags (mine) ton	20.00 to 23.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig, bbls., lb.	18 to .18½
Calcium Pig, bbls., lb.	18 to .18½
Zinc Sulphide, bbls., lb.	11.50 to 11.75

WOOD PULP

Prices, dollars per short, air dry, ton, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

Bleached sulphite, Swedish	185.00 to 195.00
Bleached sulphite, Finnish	187.50—
Bleached sulphite, dom.	124.00 to 135.00
Easy bleaching sulphite	—
Unbleached sulphite, Swed.	155.00 to 165.00
Unbleached sulphite, Fin.	155.00 to 157.00
Unbleached sulphite, dom.	126.00 to 135.00
Unbleached kraft, Swedish	147.50—
Unbleached kraft, Finn.	147.50—
Unbleached kraft, northern	125.00 to 135.00
Unbleached kraft, southern	110.00 to 125.00
Bleached sulphate, Swedish	185.00 to 190.00
Bleached soda, domestic	130.00 to 135.00
Sulphite screenings, dom.	60.00 to 70.00
Sulphate screenings, dom.	60.00 to 70.00
Groundwood, domestic and Canadian	80.00 to 85.00

PAPER

f.o.b. New York City

Boards—	per ton
Binders	94.00—
Chip	90.00—
Chip, tube and can	95.00—
Chip, full blanketing	97.50—
Chip, sgl. mla. lined	95.00—
Coated, white patent .016	120.00—
.020 and heavier	110.00—
Kraft liner	72.00—
Filled News	90.00—
Container	90.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ten lots)
Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	14.25—
B Grade E. F.	13.30—
C Grade E. F.	—
D Grade E. F.	—
No. 2 Uncoated Offset 4 sides, White	—
Machine Coated White (Trimmed 4 sides)	
No. 1 Glossy	19.55—
No. 2 Glossy	18.30—
No. 3 Glossy	17.00—
No. 4 Glossy	—
No. 2 Offset	14.00—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt.
(In Ton Lots)	
Extra 100% Rag	52.30—
100% Rag	44.30—
75% Rag	35.50—
50% Rag	29.50—
25% Rag	26.25—

Rag Content Ledger—	per cwt
(In Ton Lots)	
Extra 100% Rag	50.50—
100% Rag	44.50—
75% Rag	35.50—
50% Rag	29.50—
25% Rag	26.25—
Sulphite Bond—	per cwt
Air dry, watermarked	—
No. 1 watermarked	18.50—
No. 2 watermarked	17.55—
No. 4 watermarked	16.85—
Sulphite Ledger—	per cwt. Zone 1
No. 1 watermarked	18.35—
No. 2 watermarked	18.05—
No. 4 watermarked	17.35—
Glassine (f.o.b. mill)—	per cwt
Embossed (25 lbs. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof— Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
News—	per ton
Rolls, Standard (Contract)	100.00—
Rolls (Spot)	(Nominal)
Sheets	119.00—
Tissues (Carlots)—	per ream
White No. 1	1.85—
White No. 2	1.75—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.85—
Manila	1.60—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.80—
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.80—
Toilet, Bleached (M. shts.) per cs	8.50 to 10.00
Toilet, Unbleached (M. shts.) per cs	8.50 to 10.00
Towels—	per case
Bleached	4.75—
Unbleached	4.00—
Wrappings (Kraft)—	per cwt.
Super-Standard	9.00 to—
No. 1 Wrapping	7.25 to 8.00
Standard Wrapping	7.00 to 7.25
Standard Bag	6.50 to 7.00
Variety Bag	—

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)

Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 30 lb. (Carloads only (10,000 lbs.)	—
Drug wrapp., 35 lb.	—
Unbleached Papers—	
Com. Gr. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	—
Envp. Mla., Sub. 16-28 (No. 2)	—
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	—
No. 2	—
M.G. Sulphite and Kraft (other than Waxing)	
Grade R20 lb.	—
Grade A-22 lb.	—

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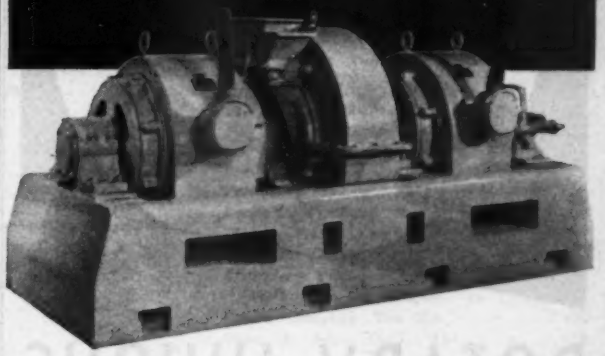

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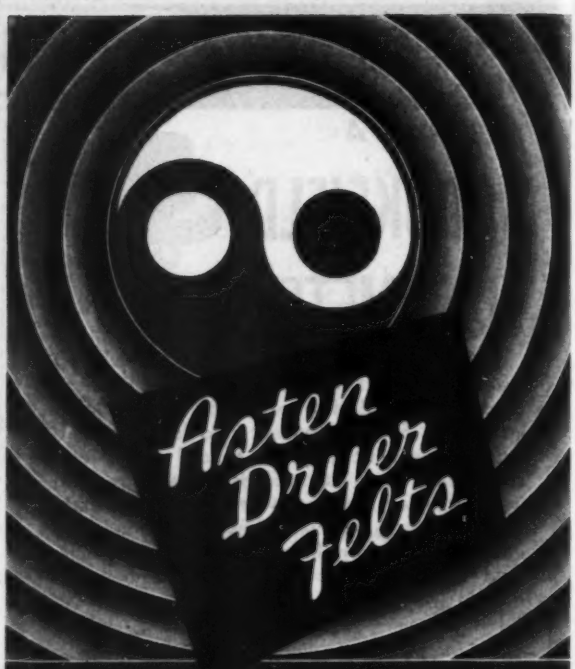

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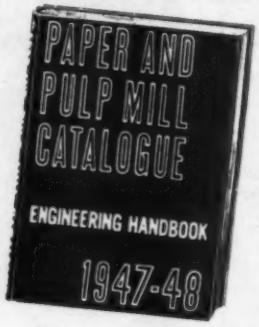
1947-48



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Black-Clawson Co., The
Blaw-Knox Div. (Blaw-Knox Co.)
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Buckman Laboratories, Inc.
Buffalo Forge Company
Buffalo Pumps, Inc.
Buflovak Equipment Division of Blaw-Knox Co.
Bulkley, Dunton Pulp Co., Inc.

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Carbonite Metal Company
Carthage Machine Company
Cash Company, A. W.
Chain Belt Co. of Milwaukee
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Chicago Bridge & Iron Co.
Chicago Electric Co.
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Clark-Aiken Co., The
Control Equipment Corp.
Crane Co.

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DeZurik Shower Company
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Downingtown Mfg. Co.
Dresser Industries, Inc.
Duriron Co., Inc., The

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Farrel-Birmingham Co., Inc.
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Garlock Packing Company, The
Gates Engineering Company
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Glens Falls Machine Wks., Inc.
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Golden-Anderson Valve Specialty Co.
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Hardinge Company, Inc.
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Jeffrey Manufacturing Co., The
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Moyno Pump Div., Robbins & Myers, Inc.
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National Casein Sales
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Rice Barton Corporation
Robbins & Myers, Inc.
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Ross Engineering Corp., J. O.

Sandy Hill Iron & Brass Works
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Sinclair Company, The
Smith Corporation, A. O.
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Swenson Evaporator Company
Syco Manufacturing Corp.

Taylor Forge & Pipe Works
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Valley Iron Works Company

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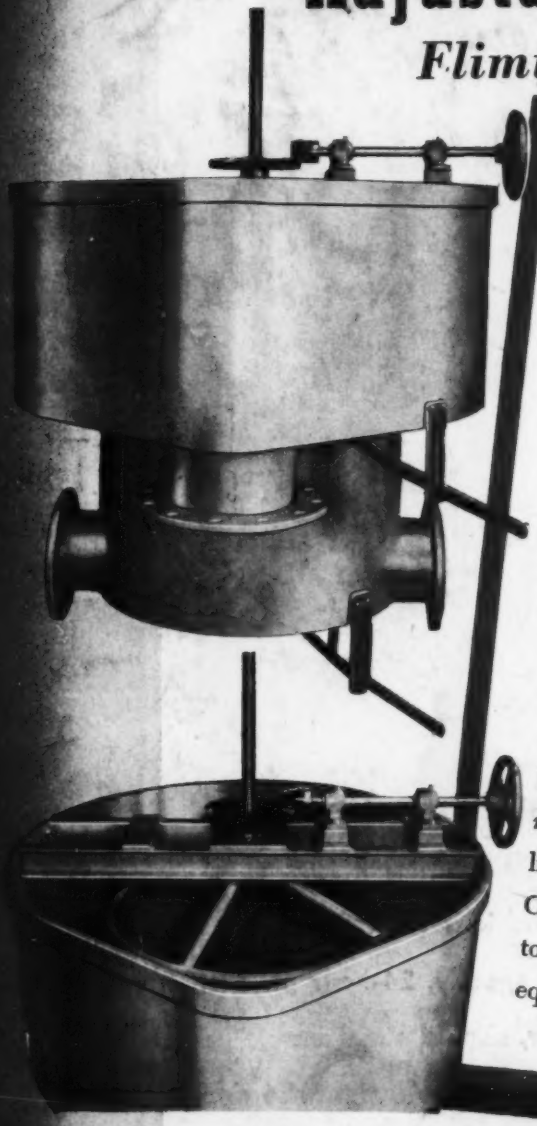

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An adjustable baffle turns the trick; it's easily controlled by the operator through a conveniently located hand wheel. Inlets for both stock and water are at the *bottom* of the mixing chamber (where they belong, for a thorough mixing job); stock-collecting pockets have been eliminated; all boxes are custom-built to *your* requirements.

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